RHODE ISLAND OIL SPILL

HEARING

BEFORE THE

SUBCOMMITTEE ON OCEANOGRAPHY
AND THE GREAT LAKES

OF THE

COMMITTEE ON
MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

ON

EVENTS LEADING UP TO THE JUNE 23, 1989 OIL SPILL OF THE GREEK-FLAGGED TANKER, *WORLD PRODIGY*, OFF THE COAST OF RHODE ISLAND AT BRENTON REEF

JULY 5, 1989—NEWPORT, RHODE ISLAND

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RHODE ISLAND OIL SPILL

WEDNESDAY, JULY 5, 1989

House of Representatives,
Subcommittee on Oceanography and Great Lakes,
Committee on Merchant Marine and Fisheries,
Newport, Rhode Island.

The Subcommittee met, pursuant to call, at 9:40 a.m., in the Great Hall, Salve Regina College, Ocher Pointe Avenue, Newport, Rhode Island, Hon. Claudine Schneider presiding.

Members present: Representative Schneider.

Also present: Representative Machtley.

Staff present: Peter Marx, Minority Professional Staff, Committee on Merchant Marine and Fisheries; and Bob Rendine, Executive Assistant to Representative Schneider.

Ms. Schneider. We will begin this hearing this morning.

OPENING STATEMENT OF HON. CLAUDINE SCHNEIDER, A U.S. REPRESENTATIVE FROM RHODE ISLAND

Ms. Schneider. This is a field hearing under the jurisdiction of the Subcommittee on Oceanography and the Great Lakes of the Committee on Merchant Marine and Fisheries. Despite the fact that many of our guests here today who are from Washington recognize that it is truly rare for a Member of the Minority party to be convening a hearing, I regret to report that the Chairman of the Subcommittee was unable to join us today because of a last-minute health problem in his family, so we have been authorized to conduct this hearing with a court reporter along traditional lines.

So it does give me great pleasure to have the opportunity to chair this hearing this morning, and also especially to welcome my colleague, Congressman Ron Machtley, who will share in the questioning, and perhaps some of the answers that we will be exposed to this morning.

Let me begin by saying that all of the comments will be included in the record, and your testimony in writing will also be incorporated into the record. And so we would ask each of our witnesses to summarize their comments and take no more than five minutes, so that most our time can be spent on questioning.

Let me begin by also giving you a brief chronology of the occurrences, so that we can all be beginning from the same starting point.

At 4:40 p.m. on Friday, June 23rd, the Greek-flagged tanker *World Prodigy* sped into the rocks at Brenton Reef, spilling 420,000 gallons of No. 2 heating oil, the second largest oil spill in New England's history, the largest was 8 million gallons spilled by the *Argo Merchant* back in 1976.

The ship was en route from Bulgaria to the Port of Providence and entered Rhode Island waters without the State-required pilot on board, as we had learned in previous hearings. Through a series of inexcusable human errors, the 17,000-ton vessel wound up hitting one of the most visible and well-marked navigational hazards in New England.

This disaster, however, is all too common in U.S. waters because last year, the Coast Guard responded to 7,500 spills of oil and toxic substances, 12 of which were considered major spills, over 100,000 gallons, although most were small, under 1,000 gallons.

From 1980 through 1986, the Coast Guard reports that 91 million gallons of oil and 36 million gallons of other toxic substances have spilled into the United States waters. Of the spilled oil, two-thirds came from oil tankers and barges. From 1981 through 1988, the Coast Guard reported 981 accidents involving U.S.-registered tankers, including 175 collisions.

In that same time, there were 413 foreign-registered tankers involved in accidents in U.S. waters. It was also revealed last week that oil companies were cited for 16,000 environmental and safety violations on offshore oil rigs during the last four years alone. No civil penalties were levied, and only one criminal penalty was.

The good luck of Rhode Island was that as with the *Argo Merchant* oil spill 13 years ago, Rhode Island and the rest of New England dodged a bullet. It was not so much what clean-up crews did but what Mother Nature did and how she acted on our side.

Thirteen years ago, we were spared because of strong winds blowing heavy oil further seaward. Last week, we were saved because of virtually no wind and the fact that the oil was very thin, although highly toxic No. 2 fuel oil, which evaporates very quickly.

These conditions, combined with the superb response by the Coast Guard, enabled us to control the oil's impact on our very fragile ecosystems. Insofar as clean-up technology is concerned, for at least the past decade, the oil industry has claimed that technological advances prevent spills and make it possible to mop up most oil when oil spills do occur.

These claims, unfortunately, have proven to be totally off-base. Oil spill cleanup technology has been unchanged for the past 20 years. It is rather primitive and remarkably ineffective, and neither the Government nor big oil has spent much on improving it.

Skimmers and containment booms often do not work in rough seas or where there is any type of current. Chemical dispersants, much ballyhooed by the oil industry, fail 94 percent of the time, according to an unpublished U.S. Government report.

And dispersants can at times make the situation much worse. The natural recovery rate of oil for open sea spills has remained the same for about the past 20 years—2 to 10 percent of the oil is recovered.

The U.S. Government must share the responsibility for neglecting improvements in oil spill clean-up technology. Raising the cost of carelessness is one of the best ways to induce the oil industry to operate more safely. We must make sure that they pay heavily when there is a spill.

The Oil Spill Liability and Compensation Act, which has passed the House four times in the past 10 years, would do just that. It will raise the limit of liability on oil tankers by more than three times, and will allow for automatic claims by third parties such as fishermen, restaurants, motels and even individual boat owners.

I regret to say, however, that that legislation, although it has passed our own Committee four different times in the last 10 years, has never made its way through the U.S. Senate.

Well, during the past week, there seems to have been a consensus that No. 2 fuel oil was highly toxic, but that it also evaporated very quickly, but there are many unanswered questions that we are particularly seeking to answer here today.

What will the effects of the spill be on the Bay's shellfish, which supplies 25 percent of all hard-shell clams in the United States?

During the first few days, people smelled the oil miles from the Bay. Some were even sick to their stomach. Will the oil spill particles in the air pose any danger to those people or to the people who were involved in cleaning up the spill?

As we know, No. 2 oil does contain benzene, which is a highly carcinogenic and toxic material. It is critical that we look closely at this instance and for the future to assure that we are taking the best possible actions to protect those who are involved in the cleanup process.

Will there be any long-term effects on the populations of lobsters or fin fish? Did the spill damage any delicate wetlands or estuaries, such as Narrow River, and what can we anticipate for the future?

Are our monitoring systems, whether they be monitoring systems of the Environmental Protection Agency or NOAA or the University of Rhode Island, are they adequate for us to measure the kinds of impact that are so very important to know about insofar as our ecosystems are concerned?

So, having given you a little lay of the land, let me now call on our first panel of witnesses, Dr. Norbert A. Jaworski from the Environmental Protection Agency, if you will please come to the witness table; Mr. Bob Bendick; and Dr. Ken Sherman.

As I mentioned at the outset, your testimony will be included in its entirety. If you choose to summarize your remarks for purposes of extended conversation, please feel free to. So, Dr. Sherman, would you like to begin, please?

STATEMENTS OF DR. KENNETH SHERMAN, DIRECTOR, NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NARRAGANSETT, RHODE ISLAND; DR. NORBERT A. JAWORSKI, DIRECTOR, OFFICE OF RESEARCH AND DEVELOPMENT, ENVIRONMENTAL RESEARCH LABORATORY, NARRAGANSETT, RHODE ISLAND, ACCOMPANIED BY DR. GERALD PESCH, ACTING BRANCH CHIEF, BIOLOGICAL EFFECTS BRANCH; AND ROBERT BENDICK, DIRECTOR, RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, PROVIDENCE, RHODE ISLAND

Mr. SHERMAN. Thank you, Congresswoman Schneider. We do have prepared remarks that have been submitted previously. They are in essentially two categories:

The first category deals with the sequence of the actual response from a scientific point of view, and I would summarize those remarks simply by indicating that we were fortuitous in having ready access to a NOAA research vessel, *Gloria Michelle*, up at Davisville, and were able to respond at 5 a.m. on the day following the spill, that is Saturday morning, so that we were able to sample for those species at risk with regard to commercial and recreational fisheries by focusing on the early life stages, that is, the fish eggs and larvae. We felt they were at greater risk in that they, for the most part, occupy the upper levels of the water column and would have been in contact with the actual oil at the sea surface.

The second component of our prepared testimony deals with a damage evaluation to the fisheries, and if the Committee would like, I can read the statement, which is about three or four minutes in length.

Ms. **Schneider**. That would be fine.

Mr. **Sherman**. The damage inflicted on fishery resources from any spill is dependent on the areal and temporal extent of the spill and the toxic effects of the substance. In the case of the *World Prodigy* grounding and spill, the timing from the fisheries productivity perspective could hardly have been worse.

The spill occurred during an annual peak in the natural production of the Bay. Many fish species were spawning and their fish eggs and larvae were abundant in the waters of the entrance to the Bay where the grounding occurred.

The zooplankton populations that serve as food at the base of the food chain for larval fishes and lobsters were swarming throughout the area sampled, both in the surface and subsurface of the oiled waters, as well as in the adjacent areas sampled that were uncontaminated by oil.

The species at risk from the spill were estimated from examination of 20 percent of the samples collected by the National Marine Fisheries Service of NOAA. The species present in samples included eggs and larvae of butterfish, mackerel, scup, tautog, cunner, silver hake, white hake, menhaden, anchovy, goosefish, searobin, rockling, two small species of flounder, lobster, crabs and their zooplankton prey.

In samples collected from the surface slick, we observed moribund and dead larval fish, lobsters, crabs, and opaque fish eggs. The examinations were made by microscope on the deck of the vessel.

In the surface samples from the adjacent oil-free water, we observed the same species. However, they were vigorously moving following capture and were in a healthy state based on visual examination by microscope on the deck of NOAA's research vessel, *Gloria Michelle*.

No evidence of moribund or dead eggs, fish larvae, lobster larvae, or on their zooplankton prey were observed in any of our collections of Tuesday, 27 June, made over the same region as the prior sampling of Saturday, 24 June.

We are now in the midst of a quantitative assessment of the impact of the oil on larval fish and zooplankton. The results will be made available following a detailed quantitative analysis.

[The statement of Mr. Sherman can be found at the end of the hearing.]

Ms. SCHNEIDER. All right. I thank you very much.

Now, could we hear from Dr. Jaworski, please, from the Environmental Protection Agency?

STATEMENT OF DR. NORBERT A. JAWORSKI

Mr. JAWORSKI. I do have a prepared statement, and I believe you have a copy. My name is Norb Jaworski. I direct the EPA Research Laboratory in Rhode Island at Narragansett. I am accompanied by Dr. Gerald Pesch, who is the Acting Chief of the Biological Effects Research Branch and he is an aquatic biologist.

I am pleased to testify here on the results of our monitoring program regarding the oil spill in Narragansett Bay. The lab received a call from our Boston region on the evening of June 23rd, and was asked for technical assistance. We put a few phone calls together on Friday night, and met together as a team with URI early Saturday morning.

The objectives of EPA's effort were two-fold. One was to conduct a reconnaissance exposure sampling survey of the impacted region, and two, to produce chemical and biological effects data sufficient for an initial risk assessment.

These efforts were coordinated with the URI School of Oceanography, the Narragansett Bay Program, and the School of Ocean Engineering at URI. We met on Saturday morning to plan jointly what URI and EPA would do. The sampling stations for the EPA survey are on the chart to my right.

The stations include the Bay proper and one sampling station on the Narrow River. Sampling by the EPA crew, including a URI scientist, began at high tide on Saturday. Samples were taken below the surface to measure the amount of oil being incorporated into the Bay waters, which we thought was an important aspect.

Water samples from select stations were returned to the lab for both chemical and toxicological analysis. A suite of short-term bioassays were used to test for biological effects associated with the oil in the water.

We also obtained water samples by Coast Guard divers on Saturday to determine if oil was penetrating the Bay proper. The data was compiled on Sunday morning, where we met again with URI, GSO, and the State personnel. On Sunday sampling was repeated at the very same suite of stations we had sampled on Saturday.

Samples were also taken in Narrow River and at the intakes of our lab and the intakes of GSO, because we saw on Saturday oil on the water above our and GSO's intakes.

In addition to the assessment of water column exposures in the Bay, we also responded to a request for oil contamination on lobster and lobster pots. At the request of Carolyn Karp, who was coordinating the State effort, we sent a marine chemist to investigate this suggestion.

Samples from the lobster pot and the lobsters, as well as other observations, proved negative for oil contamination.

Throughout this whole process, we maintained the custody of records for all samples. Chain of custody is very important, especially in damage assessment.

Finally, I can report that we are also cooperating with the State of Rhode Island. Two members of our staff are participating in short and long-term studies of effects on the marine plants and animals found along the coastline.

In summary, our major finding indicates that very little oil has mixed into the sea water. I think that is a major finding that attributes to why we have not seen the impacts on marine life. Most of the oil remains on the surface. There was some immediate toxicity associated with these low levels of oil. These effects appear to be very short-term.

By Wednesday, June 8th, the effects were minimal. In fact, today, we are back out sampling right at this very time, so we will have, in addition to the Sunday, Monday, and Wednesday surveys of last week, today we will have further follow-up data on the very same stations.

The results that we have seen, especially the toxicity data, are consistent to that just reported by Dr. Sherman. The impacts on the shoreline may be longer-term. These here we have to wait for the data as it comes in.

This is a very brief statement of my testimony. Dr. Pesch and I will be happy to explain the data compiled for this testimony.

[The statement of Mr. Jaworski can be found at the end of the hearing.]

Ms. SCHNEIDER. Great. Thank you very much.

And Mr. Bendick from the Department of Environmental Management.

STATEMENT OF ROBERT BENDICK

Mr. BENDICK. Thank you very much, Congresswoman Schneider. I appreciate your holding this hearing this morning, Congressman Machtley as well. I have with me John Stolgitis, who is Chief of the Division of Fish and Wildlife from DEM, who has been very much involved in the monitoring program, as well as Carolyn Karp, Chief of the Bay Project, who, on behalf of the State Government, coordinated our efforts to understand the immediate damage, to assess damages, and to tie in this effort with the long-term Bay project so we understand how this fits in the overall long-term health of the Bay; also to carefully assess and work with the other agencies on the monetary damages that can be expected.

Also, I want to thank all the other agencies, Federal and State, for their participation in both the cleanup and monitoring program. It has really been remarkable how helpful and cooperative everybody has been. I went out over the last couple days myself and walked some of the most affected areas, and it is true that much of the life in the intertidal zones and the rocks of Jamestown and other areas is dying.

Thousand of mussels, millions, I suppose, and barnacles and other creatures there, and I think we can, in looking at that, imagine what would have happened if the entire tanker went down and if that much oil had spread throughout the Bay.

The damage today has been, I think, well summarized by my fellow panelists. The oil does not seem to be present in the surface or underwater areas as of now. Clearly, the intertidal zone has been severely affected. The zooplankton in the surface waters of the area of the spill was killed off. The bottom impacts are not clear, and our monitoring of the bottom impacts have not seen a major problem there.

Bird kills were limited. We do have a concern, I think as does the U.S. Fish and Wildlife Service, about the plover at Trustom Pond National Wildlife Refuge. There were deaths of some chicks shortly after the spill, and it may—it is not clear whether those were going to happen anyway, whether they resulted from the amount of activity on that beach surrounding the spill, or were as a result of the spill.

Some oil did hit Moonstone Beach. Salt ponds did not sustain major damage. The booms at the Narrow River seemed to have worked to some extent. Some of the other breachways, had we had a major amount of oil, the booms would not have worked because of the amount of current there.

In terms of human health, using the helicopters for reconnaissance, the State was very, very conservative in beach closures, and I don't believe that any swimmers, any significant number of swimmers or any beachgoers were exposed to oil, because we watched that carefully. Some people said we were too conservative. We thought that was our job.

Similarly, with shellfishing, we were very, very conservative with shellfishing. The upper Bay, well north of the spill, is now open. The lower Bay, in the area of the spill, is still closed until we can get some more monitoring from these folks, because we want to preserve the integrity of the island shellfish industry.

We do have some concerns about the impacts on the general public and the cleanup workers of the air quality during the time of the spill. We have had some severe—we have had some reports of people having problems. I talked to Dr. Scott about putting together a follow-up health assessment on this problem.

I do think that we have some concern about the clean-up workers. People got very enthusiastic out there in dealing with this spill, including the workers of the contractors, and I think we have to follow up a bit on that.

There are a few policy lessons that I think we need to learn from this. First, we have got to do a better job of keeping oil on the ship. Once it gets out, we are all in agreement that it is very difficult to contain. I feel the captains of these ships need a far greater level of responsibility. I would liken it to airline pilots. I think the same kind of testing and follow-up and proficiency testing that we subject airline pilots to ought to be done for major tanker captains.

Secondly, I think there are some possibilities in LORAN technology to program—you can do all sorts of amazing things with LORAN these days, to program LORAN technology to allow for warnings, directions to be automatically broadcast over a computer or printed out over a computer, as you are approaching a port, in the language that the captain is comfortable with when he is entering a pilot zone or whatever.

We still have a problem with dependence on foreign oil, and finally, I think that the owners of the shipping companies and the oil companies must be made far more liable and responsible for their actions.

The rash of spills that we have had are certainly not an accident. They are individual accidents. They are a collective reflection of the weakness in the industry. I think that the liability legislation which has been proposed is important, so long as it does not shield the individual owners and operators of these vessels from personal liability for their actions.

This is a very high-income industry that can afford a lot of damage, monetary damage. The individuals have to be held responsible. I think we need to do some more on resuming cleanup research. As Congresswoman Schneider said, research has not been followed up on in the last couple of years. Many of the techniques for cleanup are environmentally damaging.

Clearly, boom and skimmer technology needs a lot of work. In the area of preparedness, I think we demonstrated that given the technology available, both the Coast Guard and the State were reasonably prepared in dealing with this spill, but the technology leaves a lot to be desired. I think the proper booms and skimmers need to be poised around the country for immediate response, and I think in Rhode Island's coastal areas, we need to design and build booms for specific locations that are put in the water, tested ahead of time, engineered ahead of time, and stored next to the site so they can be put up instantly.

And finally, in the area of preparedness, it seems that the Coast Guard triggering of a response team ought to include an immediate triggering of money for environmental damages and monitoring and not just cleanup.

We did have a little concern about who was going to pay for all this stuff, the State response fund agreed to pay for it. I think the Federal Government, when a spill is federalized, ought to pay immediately.

Having been on the ship on Friday night, there were a couple of moments there when things looked pretty precarious and when the chances of that ship sinking seemed quite good. I think it was through the collective will of the people of Rhode Island and the Federal and State agencies that the ship did not fall apart. I think people realized the incredible consequences of that.

We can't count on all that happening all the time. In fact, as much oil is spilled in Narragansett Bay or gets into Narragansett Bay each year as was spilled by this ship from other sources, so to prevent damage to the Bay from petroleum products, I think we need to pursue these solutions that I have suggested, and I am sure there are many others to hold the corporations responsible for transporting oil to a very high standard, and to hold ourselves to a high standard in what we do in our houses and industries here in Rhode Island.

Thank you.

[The statement of Mr. Bendick can be found at the end of the hearing.]

Ms. SCHNEIDER. Thank you very much.

At this moment, let me commend you for the outstanding leadership job that you did in coordinating and consolidating all of the efforts in the cleanup process. I think that all of Rhode Island is most grateful for your leadership, Bob, in this process.

Let me also commend the two Federal agencies for your dynamic work, and my question leads into that. Having had the advantage of participating or sitting in on the briefing that you had called Saturday after the event, or the Sunday after the event, I was very impressed that both of your Federal agencies, EPA and NOAA, jumped to the forefront to begin the research immediately.

Just for national purposes, were there any bureaucratic barriers that you had to jump over in order to know that you could go ahead and establish research and monitoring points along the way or were you able to do that of your own initiative?

Did you have to get clearance about the extent of the monitoring system that you would establish?

Mr. **Sherman**. The only answers required on the part of the Narragansett Laboratory of the National Marine Fisheries Service, NOAA, was essentially to contact the regional person, and in this case the regional person that was contacted is the Regional Director of the National Marine Fisheries Service.

That was simply to advise him that we were on the scene and prepared to go, and there was no problem with regard to that. The only issue was reaching him at home at 7 p.m.

Ms. **Schneider**. Right. Good enough.

Dr. Jaworski, did you have any difficulties?

Mr. **Jaworski**. From my viewpoint, since I was called by our Boston regional people and our administrator, Mr. Reilly being at the spill site on June 24, I think it pointed out that on a national basis (what Bob Bendick alluded to), there appears to be a gap in our legislation that doesn't allow for immediate ecological assessment parallel to what the Coast Guard is doing as far as the immediate cleanup response. Therefore, we collectively pooled our resources. I don't think that is the appropriate way to handle that issue on a national basis.

Ms. **Schneider**. That is partially why I am raising this question, because interestingly enough, before the oil spill happened in Rhode Island, I had introduced legislation calling for essentially the components that Mr. Bendick had outlined. The legislation that I have introduced now is growing in terms of co-sponsors since the oil spills in Rhode Island and in Delaware and Houston. The legislation also required that there be not only equipment but also response teams that would be financed by the oil companies, and these would be within each region and fitted for each region.

As we know, some of the strong currents of Narrow River, as you point out, require different types of technology, different types of booms, and so that it is appropriate that we have technology that is most suited for those regions.

What we use in Narragansett Bay is certainly different than what they had to use in Alaska. This legislation would call for the equipment and the response teams, available 24 hours, to be available in each region and then, finally, they would have to prepare contingency plans that would be reviewed on a regular basis by the Coast Guard. Getting back to your point that there needs to be added responsibility for the captains of these vessels, just as there is responsibility for the pilots of various airplanes.

So, this legislation is now moving along. I only wish that we had passed it long before our spill had occurred, but I think that that is the direction that we are moving in. I thank you for your support of that proposal.

One of the other things that I wanted to ask you, Dr. Sherman, is that you mentioned that much of your monitoring was through visual examination. How, granted that would be the first step, but to what other degree is the scientific community involved in doing monitoring, particularly of the tautog and some of the other fish that are involved in early life stages?

What is the status there beyond visual examination?

Mr. Sherman. Yes. Beyond the visual examination, we are looking at the quantitative assessment with regard to numbers of individual eggs and individual larvae, and the zooplankton prey. We do have a data base that is a 15-year data base that NOAA has available for comparison in terms of those quantitative estimates.

In addition to that, the University of Rhode Island has a very extensive data base for the zooplankton and the phytoplankton, that is, those organisms at the base of the food chain for the Narragansett Bay area. It is one of the better studied areas of the world, in fact, so that from a scientific point of view, we are rather fortunate in that we do have data bases available against which to make the quantitative assessment in terms of numbers, mortality, and the probable effects of the oil on the species at risk.

Ms. Schneider. OK. Thank you very much.

Congressman Machtley, would you like to ask some questions, please?

Mr. Machtley. I want to commend Congresswoman Schneider for having this hearing. I think all too often, we have hearings too far removed from the actual incident, and we often forget many of the things which are at the front of our minds immediately after, and so you are to be congratulated for having the foresight to get this hearing put together.

I, too, would like to congratulate Mr. Bendick and Dr. Sherman, Dr. Jaworski, particularly Bob Bendick, who I observed personally with just tremendous energy and countless volunteers throughout the period of this oil spill.

I think Rhode Island is very fortunate to have you leading this effort, Bob. You are certainly to be congratulated. Which leads me to the next question, and that is, is there, in your mind, a clear definition of what would be the State's role vis-a-vis cleanup, and what would be the Coast Guard's role vis-a-vis containing the spill?

For instance, supposing a State along the coast doesn't have someone like Bob Bendick who is going to take charge. Is it clear in your mind who would take charge? I mean, will the Coast Guard come in or do they just rely upon the State?

Mr. Bendick. Well, first, thanks for the compliments, but the team at DEM was really responsible, and the reason it worked is because I could not even have to delegate. People would just go and do things without being asked, and that was a moving experience.

The way this cleanup split out was that the Coast Guard did have the lead on the ship, and the State working with the Coast

Guard had the lead on the land and the cleanup, and that seemed to fall in place pretty well.

Now, we have an oil spill response team at DEM that deals mostly with the small spills that happen every day, and they work on a daily basis with the Coast Guard deciding who is going to do what, so I think that was useful in creating the right atmosphere.

I have no way of knowing whether this just happened by accident. That is, that the division of responsibility between the land side and the containment on the ship just fell into place neatly.

It did, and I think it is an effective way of working, because the Coast Guard is not able to mobilize the number of people needed for land side cleanup that a State government could. If there were some way of institutionalizing that arrangement, I think that would be useful, because most States have grown in their capability to respond to hazardous and other spills, have good staffs, have skilled people who are knowledgeable about the lay of the land out there, what contractors to call when, and all that stuff.

So, I think it is a good way of working it out. When I came back off the ship about 4 a.m., when I saw 150 trucks sitting at Fort Adams and hundreds of people assembled, there is no way the Coast Guard's sort of jumping into that within a matter of hours could do that, but I think most States could, if they were clearly given that responsibility.

Mr. MACHTLEY. The other issue is knowing in advance what is on board these tankers as they come into our harbor. As I understand right now, we don't know, one, when the tanker is even going to arrive; two, we have no idea what they may be carrying; and, three, we are not sure where they are going.

It seems to me that it would be very helpful if we had some sort of system in place which could notify our DEM that we have a tanker coming into our harbors with a certain material on board, and with today's computerization, we could at least have a programmed response.

For instance, if it was a very, very toxic chemical, we would not want to find that out after we have sent people out. What, if anything, have we done and what would be your ideas in this area?

Mr. BENDICK. Well, I think something we haven't done a lot, the Coast Guard does oversee the lightering of—what happens with a lot of tankers that come into Narragansett Bay is that they sit off Jamestown. They are too big to come up the Bay, and they are offloaded in the area just north of Newport Bridge.

I think, in our view, that lightering process has been the biggest risk because a great deal of it goes on. The Coast Guard does monitor and track what goes on there. I think some kind of record would be useful, but there is another concern here that we haven't discussed, and that is the barge traffic that every day in Rhode Island, Rhode Island Sound, up and down the coast, up and down the Bay, there are barges that carry as much petroleum product as was actually spilled here, and they require no pilots for the most part.

There is a sort of loophole in the law which allows the tugs and barges to go back and forth without pilots. Now, there is a certain amount of experience that is required, so if we are going to really look at—I have always viewed a barge accident as more likely than a tanker accident.

If we are going to develop some kind of tracking system and some kind of responsibility system, I think we have to pay attention to the barge traffic as well as the tanker traffic, because—and that makes it a large job, but probably one worth doing.

Mr. **Machtley**. When I was at the Coast Guard station, I heard discussions early on about the use of dispersants, and then I heard some, even discussions about the use of trying to burn oil. But dispersants seem to be a concern. I was wondering whether Dr. Sherman or Dr. Jaworski, you have any views on the use of dispersants; and had dispersants been used, what effect, if any, that may have had on our wildlife.

Mr. **Jaworski**. We did some testing, at the lab, about 10 years ago, on the combination of oil and dispersants. The two in combination are indeed more toxic. I would like to follow up on what Mr. Bendick said about having a plan like a national contingency plan.

Besides oil, the cargo coming in and out of Narragansett Bay, we know, for example, includes caustic chemicals. We don't have good analytical methods for those. To follow up on a plan, we have to know what is coming in, to Narragansett Bay and have a good capability of analytically measuring these materials.

With barge traffic as well, I see that there is not only a gap in Coast Guard jurisdiction, but also in analytical capability of measuring materials carried by the barges.

But back to your question, the two, oil and dispersants, are more toxic together, and I am glad we didn't use the dispersants.

Ms. **Schneider**. Let me follow up on your answer, if the gentleman would please yield. How is it that if you were to be notified about vessels, barges or whatever coming in with other toxic materials, realistically what would be the mechanics of that? You would have the pilot convey that information to——

Mr. **Jaworski**. OK. I think national estuarine program, or some national program, the CCMP, which is the final product of the Narragansett Bay program, should provide for a monitoring program. As part of that monitoring program, a contingency monitoring plan would be in place in case of a spill, including having established analytical capability. The plan should have the full capability of actually sampling the spill. I think the long-range program should contain a monitoring program for short-term ecological assessment.

Ms. **Schneider**. But you already at the lab have the capability of doing those measurements now, though, do you not?

Mr. **Jaworski**. We don't know what all the chemicals are in the traffic. We happen to be working on hydrocarbons, so we had that capability. There are other chemicals we may not have the capability of measuring.

Ms. **Schneider**. Did you have some additional questions?

Mr. **Bendick**. Could I please add something that just occurred to me? Under Title III of Superfund reauthorization, we do have contingency plans for all industrial plants in the State, and they have to say what they are carrying, what is in that plant, so when the Fire Department responds and our people respond, they don't have surprises.

It may be that there is a way of modifying that to allow ships or companies that are bringing ships in and out of the Bay to file a plan or file a report which says that they are bringing in and out, and what the risks of that is, and tie it in with that thing, which works quite well.

The Superfund Title III emergency response stuff has been very, very useful.

Ms. **Schneider**. Well, this is, I think, an excellent recommendation, because our legislation, as I mentioned, calls for a contingency plan, but I think the opportunity to have it as defined, as you are suggesting, is a very good one, so there is still opportunity for amending this legislation.

I thank you for that input.

Mr. **Machtley**. I just wanted to follow up, going back to the dispersants, because I felt there were questions being raised by people; should we, should we not; and I guess my question is, if you who are in the scientific community had an input, how quickly can you get to every place, I mean to say you should, you should not use dispersants, you know, in terms of long-range environmental effects, because I heard a lot of people discussing it who had some authority to make some decisions, and it didn't seem like they had some definitive guidance, so my question is, who in the organization is going to come in and say this is what you should do?

Ms. **Schneider**. Yes, I would like to respond to that, Congressman Machtley. So far as NOAA is concerned, as an agency, the issue has been addressed, not specifically with regard to dispersants, but rather, with regard to how NOAA ought to be responding to spills, oil spills and other spills of toxics.

So there is an organizational element within the agency that has people on call 24 hours a day with expertise principally on the nature of the various kinds of toxicants, including oil, and the likely trajectories based on whatever modeling information can be assembled.

In this case, fortunately, the private group that has developed a model for a trajectory of oil like No. 2 on the surface, given certain wind conditions and tide conditions was local. It was ASA Associates.

The NOAA response team was able to work with the ASA Associates to plot that trajectory. They would also have been on site to make a decision, so far as the agency is concerned, with regard to use or non-use of dispersants.

Mr. **Bendick**. I think the decision ultimately came to the State, to the guys in the field there. They were asked whether to use dispersants. The Coast Guard asked the State whether that was appropriate, and the guys involved—I wasn't there at the time—consulted Carolyn Karp in our Fish and Wildlife Division, and they said no, because dispersants were likely to sink the oil, and that was a lot worse than having it stay on the surface, so it was maybe lucky that the Bay project and that all the people surrounding URI were there to give some input to that decision.

Mr. **Machtley**. Well, here again, it goes back to my point that had we not had such good people, a decision could have been made that was inappropriate. That is where I think in the legislation we need to have something that says we will use NOAA, who was expertise, to come in and assist the Coast Guard with the State so that we don't find out that someone up in an area has no experience and says, sure, let's stop the oil, and then we find out that they have actually caused more damage in the future.

Ms. SCHNEIDER. Dr. Jaworski, one last question. Since the testimony from this hearing, we will be taking back to Washington, and it will be a part of the grander scheme of our Oceanography Subcommittee looking at oil spills all over, have you been contacted by any of the other sites, by Texas or by Delaware, and asked to do any comparative assessments of biological impact or ecosystem assessments at all?

Mr. JAWORSKI. No, the lab has not, but we have a person in Alaska working on the sea mammal issue—sea otters and seals. However, the lab was not contacted.

Ms. SCHNEIDER. One last opportunity for the Federal representatives. Are there any other pieces of information, questions perhaps I may not have asked that you think it is important to incorporate into the record or as we look toward the future in preventing such oil spills and continuation of monitoring in terms of resources you have, in terms of decision-making, the freedom of decision-making, are there any other things you think could be better so we could delve into that further in the whole Committee?

Yes, Dr. Sherman?

Mr. SHERMAN. Yes, Congresswoman Schneider, I would simply like to add to the record a statement that relates to the nature of oil spills against the broad spectrum of toxicants and pollutants that are introduced into the coastal zone virtually daily around the exclusive economic zone of the United States, and that covers some 2.2 million square miles.

Now, in the case of Rhode Island and the spill that we are discussing, we were all rather fortunate. We have a very adept scientific community here, very well equipped, very well versed. In some other areas within the U.S. Exclusive Economic Zone (EEZ), that is not the case, and it is important to maintain at least some level of monitoring in these other areas against which it will be possible to measure impact of increased coastal contamination.

That is a rather important point that we should like to pass on to the Subcommittee.

Ms. SCHNEIDER. Great. Thank you. All set? Dr. Jaworski?

Mr. JAWORSKI. In our viewpoint there are three areas in addition to those Ken has suggested. One which you are championing is containment aboard the ship.

The second as Mr. Bendick indicated, the long-term plan that should be in place, and could be incorporated into our National Estuarine Program or the Gulf Initiative. The third area is in bioremediation to clean up an area once a spill does occur. Today EPA has a team working with Exxon in Alaska using naturally occurring organisms supplemented nutritionally to get more biological action. Research on the whole bioremediation area, I think, would be a prospective area of research studies.

Ms. SCHNEIDER. Thank you very much for your testimony this morning and also for the terrific work you have done for Rhode Island and the Nation and the world in the last couple of weeks. Thank you kindly.

Ms. **Schneider**. I would like to call the next panel of witnesses: Mr. Ron Coia, Secretary Treasurer and Business Manager of Local 271, Laborers' International Union of North America; and also Dr. Bela Matyas, Rhode Island Department of Health, to share with us your insights.

Once again, your testimony as prepared will be incorporated in the record in its entirety. If you choose to summarize, that would be terrific.

STATEMENTS OF RON COIA, SECRETARY TREASURER AND BUSINESS MANAGER, LOCAL 271, LABORERS' INTERNATIONAL UNION OF NORTH AMERICA, PROVIDENCE, RHODE ISLAND; AND DR. BELA MATYAS, RHODE ISLAND DEPARTMENT OF HEALTH, PROVIDENCE, RHODE ISLAND

Mr. **Coia**. Thank you.

Good morning, Congresswoman Schneider and Congressman Machtley. My name is Ron Coia, I am Secretary Treasurer and Business Manager of Local 271 in Providence, of the Laborers' International Union of North America. Accompanying me is Dr. Knut Ringden, Director of the Laborers' National Health and Safety Fund, a joint LIUNA-management initiative.

Our union is here today because we are concerned about the health and safety of oil spill cleanup workers. Among other things, LIUNA brings to this issue its nationally recognized expertise in hazardous waste worker training.

For the past three months, in Alaska, the union has worked, with some success, to see avoidable hazards lessened and training improved for the Exxon Valdez cleanup workers. We sent a team of four public health experts to assess the working conditions in April. The team was headed by Dr. Eula Bingham, a former Director of U.S. OSHA and an expert on the health dangers of petroleum; and her report is attached.

Those who have helped clean up oil spills in Alaska, in Narragansett Bay and elsewhere, without training and protective gear, continue to be at risk for long-term health problems.

We want to see oil spills cleaned up speedily to protect this beautiful Bay for countless generations to enjoy. But we want to guard against having any oil spill transformed from a potential environmental disaster to a human one. Cleanup workers should not be expendable.

The 400,000 gallons that spilled on June 23 from the *World Prodigy* apparently no longer threaten Narragansett Bay. For that, we mainly can credit favorable weather conditions and the quick response of Chief Warrant Officer Alan Beal of the Coast Guard, and other Federal officials, but we can't always depend on good luck and ad hoc arrangements.

Instead, an effective, tested nationwide emergency response plan must be in place and out of the control of the oil industry. The plan must include standing trained emergency response teams. Planning and cleanups should be funded by the oil industry.

It was not just a spill but poor emergency preparedness that made the cleanup necessary. A rapid, effective emergency response can significantly limit the spreading of spilled oil beyond a damaged ship. As a result, the amount of worker exposure to oil and the attendant risks can be reduced.

We were especially concerned to see cleanup volunteers in Bonnet Shores, and in Mackerel and Hull Coves in Jamestown, who were clearly untrained and unprotected, some of them wearing only shorts, few of them wearing gloves.

Despite what some may believe, extensive contact with oil is hazardous.

The hazards are different, but no less severe for those handling refined oil. The lighter oil may release materials into the air for a shorter period of time than does crude, but these still are toxic chemicals. They include benzene, a powerful cause of leukemia in people. The inhalation of fumes, skin contact with oil or swallowing of petroleum products are all harmful.

Long-term risks for those who have extensive contact with oil include skin cancer, kidney disease, liver disease and nervous system damage.

Short-term health problems have surfaced in Alaska, where dozens of cleanup workers have reported breathing problems, vomiting, skin rashes and boils, or other symptoms apparently tied to contact with the oil. We understand that some involved in the cleanup here have reported skin irritation or other problems.

Many conditions present in the Narragansett Bay cleanup magnify the health and safety risks. Warm temperatures speed up the vaporization of the oil and contribute to higher exposure levels. Workers in warm weather are less likely to wear even rudimentary protective clothing, and thus tend to have increased skin contact with the oil. The combination of salt water and oil can increase skin irritation.

Even though oil can't be seen or smelled, it may still be present and cause harm. Some individuals may suffer symptoms similar to allergic reactions as a result of low-level contact.

Federal law mandates special protections for workers cleaning up hazardous substances, including oil spills. The U.S. OSHA Hazardous Waste Operations and Emergency Response standards require 40 hours of training, protective gear such as respirators and special gloves, and long-term medical recordkeeping.

Training is crucial because it is the one time workers can be warned of the risks and how to avoid them.

The Laborers' International Union urges Congress to investigate in depth the four major spills of the past three months, compare the responses of these spills, and learn how to prevent and respond to future spills.

I want to thank you for inviting us to participate in this hearing, and we will be happy to answer any questions you may have.

[The statement of Mr. Coia can be found at the end of the hearing.]

Ms. SCHNEIDER. Thank you very much, Mr. Coia.

Dr. Matyas?

Dr. MATYAS. Good morning.

To begin with, as I am sure we are all aware Fuel Oil No. 2 does contain a number of toxic components. Most important among these are benzene and what are referred to as polyaromatic hydrocarbons, which are much longer, less easily volatized compounds.

Of these, the primary agent of concern under the conditions of the Narragansett Bay cleanup is probably benzene.

The health risks involved with regard the oil spill cleanup affected both workers and the community at large.

With regard to workers, it is important to remember that the risks they are exposed to are very much dose-dependent. In other words, the more of the toxic chemical they are exposed to, the greater the likelihood they will develop health problems, both short-term health problems and long-term health problems.

A major route by which exposure can occur to these workers is skin contact. The reason skin contact is important is because benzene and a lot of the aromatic compounds in Fuel Oil No. 2 are fairly well absorbed through the skin. The absorption of these toxic compounds is proportional to the surface area of skin that is covered by the oil, so clearly, wearing protective clothing will reduce the amount of available skin for absorption.

In addition, the absorption rate, the speed with which absorption occurs, increases the longer the oil is on your skin because the oil breaks down the protective barrier of the skin; so you can stand it far better for the first hour, for example, than you can in later hours, because the skin itself is less of a barrier.

The potential health effects involved through skin exposure include the short-term effects, such as contact dermatitis (a form of skin rash) and narcosis (which involves headache, dizziness, nausea, stupor, and confusion), and they include longer-term effects such as organ damage (with chronic exposure), poisoning (which would require very high acute exposures), leukemia and other cancers (which would require fairly high, chronic exposures).

On balance, the likely effects experienced by the cleanup workers that were involved in the Narragansett Bay cleanup would be the short-term effects, namely the narcosis and the skin rash. The primary reason for this is that the average worker's total exposure was not significant relative to the types of exposures shown in the occupational literature to be required for the long-term effects through simple skin exposure.

In addition to skin exposure, workers were also subject to inhalation and vapor exposure. The effects of these include eye irritation, irritation of the nose, mouth, and throat, cough, chest discomfort, chest tightness, shortness of breath, and, again narcosis.

In addition, there is a very good likelihood that any underlying respiratory conditions, like asthma or bronchitis, would be severely exacerbated by inhaling this irritant.

There is also obviously the potential for damage to the kidneys, liver, central nervous system, bone marrow, et cetera with which chronic exposures, as well as a risk of leukemia and other cancers with relatively high chronic exposures.

Again, the exposures workers experienced during the cleanup are unlikely to result in any significant risk of acute poisoning, because of the doses involved, or of cancer or major chronic organ damage.

They are, however, as evidence has borne out, more than sufficient to induce skin irritation effects, eye irritation, respiratory irritation, and exacerbation of existing respiratory conditions.

A third form of exposure that can occur, but fortunately occurs only rarely, is that of swallowing the oil; this is unlikely to occur to any significant extent but is certainly possible.

In the process of cleaning up, it is possible to generate mists of oil which you then inhale and swallow. It is also possible to have accidental swallowing occur through transferring oil from skin to mouth. For example, if you haven't cleaned our hands properly and smoke a cigarette or eat without thoroughly cleaning your skin surface, then you can clearly swallow some of the oil on your skin.

The health risks of swallowing are very similar to those of inhalation with additional problems in the GI tract, nausea, vomiting, abdominal cramps, et cetera.

Because of the work conditions involved in addition to the risks from contact with oil, the workers were subject to, in many cases, significant fatigue.

In addition to the long hours that were worked and the strenuous work conditions, it was also very warm; and when you combine the risks of fatigue with the narcosis, which can induce dizziness, headache, et cetera, the risk for accident is substantial.

I am not aware of any significant accidents that occurred among workers. It is simply the fact that the workers were subject to a greater risk of accident because of the conditions under which they were working.

In view of these risks, it is important to protect workers who are involved in cleanups. This can be accomplished through the use of proper protective clothing, which would include the use of impermeable gloves, boots and overalls, along with frequent changes of any clothing that becomes saturated with oil.

Covering the skin surfaces in contact with oil is essential in order to prevent dermal exposures. In some cases where workers are working in confined spaces, it may also be necessary to provide respiratory protection.

Most importantly, any worker who develops signs or symptoms of narcosis or any signs of inhalational problems related to the vapors from the oil should be removed from the work site and be allowed to breathe fresh, clean air until his signs and symptoms resolve.

With regard to the fatigue, although it is obviously difficult under conditions of an emergency to do so, it would be important to limit work hours so that people don't become unnecessarily fatigued.

With regard to the public, again the risks are dose-dependent. The risk depends on how much of a toxic material people in the public are exposed to. The public involved in the Narragansett Bay oil spill situation primarily had two types of potential exposures.

First, there were those people exposed only by inhalation. These were the residents in communities such as Newport and Narragansett where, basically, the air of the city smelled like oil; they people were exposed to certainly higher than background concentrations of oil vapor, benzene, et cetera.

The health effects from this primarily should have included eye irritation, irritation of the nose, mouth and throat, irritation of the lungs (which would have resulted in shortness of breath, chest tightness, coughing), narcosis (which is that syndrome of headache, nausea, dizziness, et cetera), and in the case of those people who had any tendency toward asthma or bronchitis those underlying conditions could very well have been exacerbated by this exposure.

As I understand it from reports of citizens and physicians in the Newport and Jamestown areas, that (exacerbation of asthma and bronchitis) did, in fact occur, and it did involve a fairly large number of residents.

The second way that the public could have been exposed to the oil is by direct contact. That would have involved activities such as swimming in the oil-contaminated water, which did occur in a number of locations despite the beaches having been closed. Lifeguards simply were unable to keep a lot of people out of the water.

Exposure through swimming, surfing, et cetera, would have allowed direct skin contact, as well as inhalation of the oil vapors, and in addition would have allowed for far greater likelihood of swallowing (because when you are swimming or falling into water you are more likely to swallow it than when you are under controlled circumstances).

Direct contact with oil that was deposited on the beaches and the coastal shorelines was also a possibility. The primary risks there would be ingestion of oil on the part of young children who might be eating the sand.

Finally, the public could potentially have had exposure through consumption of contaminated fish and shellfish. Fortunately, the shellfish beds were closed almost immediately. That risk was not realized except in the case of those who would not have been heeding the warnings.

In general, the health risks, for both exposed workers and for the exposed members of the public as a result of the *World Prodigy* oil spill, are going to be those of acute exposure rather than those of chronic exposure because of the nature of the spill.

Thank you.

Ms. **Schneider**. All right. That is it. I thank you very much.

I will say that Rhode Island should also be very proud that we have you at the Department of Health to assess the impact. The purpose of our hearing today is to not only look at the impact on the ecosystem as a whole, but also on human health.

Dr. Matyas, I would like to ask you about—you mentioned remedial action. If, for example, my legislation does pass, as I certainly intend that it will, for us to have as part of that legislation contingency plans. If we are going to talk about equipment on board to contain the oil, it seems to me that we also ought to have—excuse me, I didn't mean on board, but if we are going to have equipment available to respond to containment, are we in a situation now where we can say what equipment we should have also available to deal with remedial response for human health in terms of worker protection?

Dr. **Matyas**. Yes; the answer is yes. That information is definitely available to workers who have any involvement in oil refinery work, et cetera, as well as in the occupational literature, which in general makes it very clear that what you need to do is prevent contact with the skin surface (which can be done through the use of impermeable, say rubber gloves, rubber boots, overalls) and in the case of workers who have to be cleaning out oil in confined areas you may also need to have respirators.

Ms. SCHNEIDER. We are in a situation now—are you familiar with any other kind of contingency plans we could use as a model where, as we talked about, a model coming from the Superfund and hazardous waste response teams? Are you familiar with any type of similar model as it relates to health effects that we could use?

Dr. MATYAS. Certainly there is much to be learned from the models that exist for hazardous waste cleanups, the Superfund-related ones. There is no one specific model that in its entirety would be perfectly applicable.

I think what would need to be done is for there to be enough protective equipment available at DEM, at the Coast Guard, at the National Guard, and wherever it is we would be calling on people to be involved in spill cleanup, combined with some degree of periodic training of the people that would be likely involved in that.

There is obviously a fair amount of turnover at places like DEM, less so at the Coast Guard. But a periodic, annual say, or every other year, training of individuals who would likely be involved in spill cleanup, just with regard to the basics of protecting their health, would be more than sufficient. And what would really be required is just the availability of enough equipment in the way of gloves, boots, et cetera, that can be distributed at the time they would be required.

Ms. SCHNEIDER. OK. Thank you.

Mr. Coia, in your testimony you mentioned that on June 19th the petroleum industry announced a proposed plan for timely response to spills nationwide, and you point out that you feel that their plan, even though it mentions worker health, does it only as an afterthought, a small future research proposal.

In the ideal world what would you like to see incorporated by the petroleum industry as it relates to worker protection? How specific do you think they should get?

Mr. COIA. Congresswoman Schneider, I would defer to Dr. Ringen on that question, if you don't mind.

Mr. RINGEN. Let me comment on that in a little detail. First of all——

Ms. SCHNEIDER. For the record, could you please identify yourself, your title and association?

Mr. RINGEN. My name is Knut Ringen. I am Director of the Laborers National Health and safety Fund.

Ms. SCHNEIDER. Thank you.

Mr. RINGEN. There is an occupational safety and health regulation that applies to hazardous waste operations and emergency responses. That regulation, which was promulgated on March 6th of this year, did in fact, specifically include oil spills. It is the only thing that it specifically did include, because the oil industry asked for an exemption. And in its promulgation of the rule making procedure, the agency went through this issue in great detail and concluded that oil spill workers should be covered under this regulation, and that the request by the oil industry to be excluded was not valid.

The regulation requires, first of all, a site safety plan. that is a plan for how to deal with hazardous waste situations, how to clean it up properly, how to do this in a systematic way.

Secondly, it calls for worker training—40 hours of training—specialized in a curriculum specified by the Environmental Protection Agency in hazardous waste handling and removal. At least 40 hours of training of every worker involved.

Thirdly, it requires that all workers have appropriate personal protective equipment, and in the case of oil spills, including equipment that has been tested for permeation.

Additionally, it requires specific contamination procedures that a worker, for instance, when he goes off work to eat or something like that, make sure that he is appropriately cleaned and does not have contact with the oil. That includes the use of degreasers or cleaning agents that do not include petroleum products in themselves. Many of the agents I suppose have been used here include benzene in them. That exacerbates the hazard from the oil.

Fourthly, it requires environmental monitoring. On most of the oil spills we have seen there has not been adequate air monitoring to see whether workers or the public have been exposed to significant effects.

It also includes medical monitoring, that workers should receive specific medical tests, including tests for skin contact.

Finally, it includes record keeping and the maintenance of records on every worker involved for 30 years to determine whether long term health effects exist.

We believe that in all of the cleanups this spring each of these procedures has been violated in every spill. The reason for that is that under emergency conditions it is very hard after the fact to meet the requirements of the standard. We also believe that is totally unnecessary if we were prepared in advance.

Our union does probably more hazardous waste cleanup than any other union. Our training course for workers is 80 hours long. We have a very significant raining center in Connecticut that provides training for this region. We have workers available for this type of work who have been properly trained and who understand how to protect themselves adequately and who understand what is required, when you are out on this kind of work, to protect yourself.

I would like to comment on two additional things in regard to the spill here in Rhode Island. That is, I think it is exceptional in terms of the resources that have been available. I think the Federal official from EPA made note of the very fine resources that you have, including the public health test you have just heard now. It is outstanding, and is not representative of what you would find in most regions of this country. So, in terms of Federal legislation, we have to take this into account.

I also want to comment on Mr. Bendick's recommendation that Title III of Superfund be applied to oil spills. In fact, one of the hindrances of worker monitoring in Alaska has been the issue about whether Superfund does—the legislation does apply to petroleum workers or petroleum products. We have conducted an indepth level analysis of that, which we provided to your office, indicating we believe Superfund does apply to petroleum products and that the procedures under Superfund, as well as the financing mechanism, probably could be used for oil spills as well for something similar. It certainly is a good model as a start.

The differences between oil spills and general hazardous waste, which makes that legislation not totally amicable, is that an oil spill occurs as an emergency and the response has to be immediate. If you have a hazardous waste dump somewhere, you have time to plan out your response to it, while here, you have to be prepared in advance to deal on an instant basis with a very unlikely situation. That is why we say that the only way to deal with this is to be prepared, is to have standing emergency teams that are prepared and trained, and so on.

Dr. MATYAS. Congresswoman Schneider, if I may add to keep this in proper perspective, there is a difference in the types of exposures and the risks to which most of the workers involved in the oil spill cleanup here were exposed relative to oil spill workers who do this on a regular basis. In the latter case you are talking about people whose career work is to clean up oil spills, who have frequent contact with that. That is a different situation than a once-in-a-lifetime oil exposure.

That is not meant in any way to make the risks of exposure to benzene seem any less important, but rather to point out that the kinds of risks stressed by the union are very much more significant for people who have constant contact relative to those people who had only a short-term contact.

Ms. SCHNEIDER. I did pull that from your very comprehensive testimony, but I appreciate your emphasizing it. I do think that because we have to look at this in a larger context, and also as it might apply to my legislation, if we are going to have trained teams who are available to respond all the time, that does require some set standards in addition to which we can have guidelines for volunteers and additional support groups that would be helping in a time of major crisis. I thank you for pointing that out.

Mr. Machtley, do you have some questions you would like to ask?

Mr. MACHTLEY. I notice in your testimony you indicated there were 175, or at least approximately 175 people in Rhode Island who were trained. Were any of those people contacted used?

Mr. COIA. No, they were not. We have, as I have indicated, we have a number of people in Rhode Island who have already been trained in hazardous waste removal. We have those people available to us. They are also available throughout New England, having received that training at the various laborers training sites, both in Massachusetts and in Connecticut.

No, those people weren't called upon for use, but some of our people who, for example, were not trained did partake and participate in the cleanup which occurred during just last week. It is those people that I refer to in our testimony that are going to see evidence of various skin irritations and the like.

In reference to your legislation, Congresswoman Schneider, the whole thrust of our remarks here this morning is centered around preparedness. If it helps you in your deliberations with your bill, we will be happy to make available to you through your office either here or in Washington, the cost content of our hazardous waste worker training program. I am sure that you will find it helpful.

Ms. **Schneider**. Absolutely.

Mr. **Coia**. I hope you can use that as a basis from which to start, hopefully to bring about those various preparedness teams throughout the country. We would be happy, as an international union, both locally and nationally, to work with you and your colleagues in that effort.

Ms. **Schneider**. Terrific. I thank you very kindly for that offer.

Mr. **Machtley**. I trust that the thrust of what you are suggesting is also that we have in place an organization that is already training and that, therefore, we have to take your people, your training term and try to meld it into an emergency response team, and that gets me to a question of the doctor.

I saw people from the ACI come down there. I mean, are you aware, did we use any protective clothing for these people, or did we just say come on down and help us as people to respond? How did we deal with these volunteers, ~~do you~~ know?

Dr. **Matyas**. I am not aware of how that was done. That was done through DEM. I think it would be more appropriately addressed to Mr. Bendick or someone involved in actually calling them in. I can say DOH was not contacted prior to their having been called, and so I personally was not involved in that.

Mr. **Machtley**. I never thought about this issue until I walked the beach and saw those people down there. I actually got a headache myself. I was wondering what was going to affect, how this was going to affect these people. I certainly think you raise an issue which we naturally don't think about until after a spill. It is something we need to think about in advance.

I thank you for your insightful thoughts and comments here today.

Mr. **Ringen**. We would like to thank you for holding the hearings. Up until now most of the attention has been on fish and wildlife and very little with regard to humans who are involved in it. We appreciate your concern with that issue.

Ms. **Schneider**. All right. We thank all three of the witnesses for their very timely and insightful information you have shared with us.

Ms. **Schneider**. At this moment I will call for a five minute recess. No more than five minutes. We need to reconvene.

Thank you.

[A five minute recess was taken.]

Ms. **Schneider**. If I could reconvene the Subcommittee on Oceanography and the Great Lakes of the Merchant Marine and Fisheries Committee, focusing on the environmental and health effects of the Rhode Island oil spill of the *World Prodigy*.

I would like to call to the front, please, Trudy Coxe, Executive Director of Save the Bay. Also, I would like to call forward Malcolm Spaulding, Applied Science Associates, Inc., and Dean Robert Duce, from the University of Rhode Island Graduate School of Oceanography.

Dr. Spaulding, let us begin with your testimony, please.

STATEMENTS OF TRUDY COXE, EXECUTIVE DIRECTOR, SAVE THE BAY; MALCOLM L. SPAULDING, APPLIED SCIENCE ASSOCIATES, INC.; AND DEAN ROBERT DUCE, GRADUATE SCHOOL OF OCEANOGRAPHY, UNIVERSITY OF RHODE ISLAND

Mr. SPAULDING. Thank you, Congresswoman Schneider.

For those who don't know, my name is Malcolm Spaulding. I have been involved in oil spill research throughout the past 15 years, focusing on spill forecasting trajectory modeling fate and impact assessment work, particularly the impact of oil spills on commercial fisheries.

My written testimony has been submitted. What I would do here is summarize the essence of that testimony. Looking at the short term impacts of the spill in Narragansett Bay, we saw a lot of oiling of the beaches. There was significant intratidal damage associated with the spill including areas along the southern coast of Jamestown, parts of Newport shoreline, and parts of the Narragansett shoreline, from Black Point up to Bonnet Point. We saw little or no observed impacts on the southern Rhode Island coast. We predicted the same because of the light nature of the oil with its high potential for evaporation.

The short term impacts we have seen on the fisheries has been documented by the National Marine Fisheries Service, are of an acute toxic nature—substantial impacts inside the spill area, small impacts outside the spill.

In terms of the surface area, the oil at the maximum area covered 123 square miles, which is about ten percent of the surface area of Rhode Island. In terms of the overall view, that is a fairly large area.

In terms of the long term impacts, my sense is that they will likely be very small. The most significant one we are likely to see is the recovery of the beach areas, particularly heavily oiled Mackerel and Hull Coves, and to a more limited extent, the coast along Narragansett from Camp Varnum, to the Narragansett Towers.

Ms. SCHNEIDER. Could you speak into the microphone?

Mr. SPAULDING. We can also expect to see some leaching of oil out of these coastline sediments. This will be a process that will take place from weeks to months. The oil will continue to leach out and will continue to affect the coastline. After that period of time the oil will weather and disappear.

In overview, we were really lucky. It is incredible how lucky we were. We were lucky from a number of perspectives. I would like to summarize those for you:

The spill site was outside of the Narragansett Bay. It was in a deep water, low tidal current area. It was adjacent to Rhode Island Sound. It couldn't have occurred in a better place if it had to occur in Rhode Island.

The spill occurred in good weather conditions; calm seas, low wind conditions, good visibility. It makes response easier, it makes cleanup easier, it make the impacts associated with oil in the water column lower.

The oil spilled is a number 2 fast weathering oil, highly toxic. The competition between evaporation in weathering the oil and its toxicity was such that it had limited impacts.

The most fortunate of effects and the most arbitrary, was the wind. The primary determinant in terms of the impact of this spill on Narragansett Bay was the condition where the wind came out of the north for a period of about one day on June 25th. Oil that could easily have been transported and predictably transported up into Narragansett Bay and could have resulted in significant impact, was transported offshore instead.

Finally, there was excellent response both from the Federal and state people in containing this spill, in cleaning it up, and responding to those areas of a particularly sensitive nature. What is particularly amazing about all this is those things we could do well we did well.

Mother nature in the end however saved us from a really large impact from this spill.

You can take a look at the long term natural resource damage assessment for this spill using CERCLA. CERCLA regulations allow two damage approaches—type A and type B. Under a type A assessment, which is restricted to small scale spills, we use a mathematical model and limited input data to the assessment. Under type B, the assessment is more full range, more detailed and more site specific. It includes combinations of field observations, long term monitoring programs and modeling.

The assessed costs using a type A analysis for this spill are relatively modest, and certainly are equivalent to the assessment costs associated with doing a type B assessment. The suggestion here is that a type A assessment, modified and extended where appropriate would be a reasonable approach to limit the assessment costs and to maximize the accuracy of the calculations.

The problem with the type A assessment procedure, as it is currently configured, is that it has limited validation. It needs more validation work. It needs some specific documentation of performance for actual spill events. The problem is that it is too generic. It is much too general.

Because of those concerns, the CERCLA type A model has received extensive criticism. It seems to me the modeling methodology is correct if appropriately used. What we need to do is expend the resources necessary to improve and advance the CERCLA model so we can perform effective, realistic assessments.

On this spill in question, there is a tendency to look at spill response as a series of separate issues, to separate the booms, the barriers, the skimmers from the management of the people. This is an integrated system however that should be viewed as such. It is an emergency response plan much like responding to a hurricane event or anything else. It is a mixture of people, material, and management skills need to be integrated, to be able to respond to spill events.

The question raised dispersants, should we or should we not apply dispersants? The information should have been easily available to anyone that was interested in that question. Of course, dispersants were absolutely not appropriate in this particular area, because of the high number of benthic organisms and also because of peak spawning period.

The information regarding dispersant use could be readily brought to bear. That information could be integrated into a spill management system based on artificial intelligence techniques and integrated with data bases and our knowledge of the fate and transport and effect of number 2 oil on the marine environment.

With that, I will end my testimony

Ms. SCHNEIDER. All right, thank you very much.

[The statement of Mr. Spaulding can be found at the end of the hearing.]

Ms. SCHNEIDER. Dean Robert Duce from the School of Oceanography at the University of Rhode Island.

STATEMENT OF DEAN ROBERT DUCE

Mr. DUCE. Thank you, Congressman Schneider.

I have prepared written remarks on the university's response and our general conclusions, which have been submitted. In general, our conclusions agree very closely with those of Dr. Spaulding. Let me make some brief remarks, however.

As we all know by now, number 2 fuel oil is light and quite fluid and moderately volatile. Most of it's most water soluble components are quite toxic. The oil in this spill apparently remained largely on the sea surface, where much of it evaporated, but some fraction certainly dissolved in the water.

Some years ago experiments using number 2 fuel oil at the Graduate School of Oceanography at URI showed under summertime conditions the lifetime of this oil dissolved in the sea water is approximately one day. In the open waters of the bay many planktonic organisms, fish eggs, and larvae living just below the oil slick were killed. However, six days after the spill, plankton samples collected away from the shoreline show what appear to be normal populations. This rapid return of plankton is reassuring, indicating that food supplies for higher organisms are back to normal.

In heavily impacted shoreline locations, large quantities of oil floated into coves, killing many small lobsters and crabs, and probably most of the barnacles, mussels and worms in the rocks and in the sand. However, these effects appear to be confined to the top several feet, even in the most seriously impacted shoreline regions.

After three days almost no oil could be found on the surface of the water in these areas and none at all could be found after five to six days. Oil was barely detectable in Mackerel Cove after eight days, but it was still present in considerable quantities in the sand and easily detectable by smell in Hull Cove.

We expect in a relatively short time animals in the intertidal zone will have recolonized the shorelines where the previous generation had been killed by the oil. It is likely that in several months it will be difficult to detect evidence of the impact of the oil spill by examining the shoreline.

It appears unlikely that any significant quantity of oil reached the bottom of Narragansett Bay except in the intertidal regions. Accordingly, the fishery resources on the bottom, such as lobsters and quahogs, should have been largely unaffected. State and Federal agencies are examining shellfish samples to confirm this.

The University of Rhode Island collected samples of other bottom-dwelling organisms and sediments under the areas of thick surface oil coverage to examine for any evidence of oil. It will be several weeks before the results of these studies are complete.

The Graduate School of Oceanography also conducted diver surveys from our research vessel "Lauri Lee" of several areas on the bottom of the Bay where sea surface oil was abundant. These surveys, by several experienced observers on different days, showed that the animals were filtering or foraging normally. The one possible exception was an area at a depth of about 25 feet on Brenton Reef itself, very near the spill site.

From the available evidence we believe it will be difficult to document significant long term environmental effects on Narragansett Bay from this spill, although there is no doubt that in several areas there was considerable mortality in intertidal zones. However, environmental impacts could have been much worse, as Dr. Spaulding mentioned.

If there had been a continuous and strong south wind for two days after the spill, the oil would have been driven much farther north in the Bay, and the oil might have reached the bay floor with potential serious damage to the extensive commercial shellfish beds in the northern reaches of the Bay.

A winter time spill would have resulted in slower evaporation and slower removal from the water column.

We at the University of Rhode Island have been very pleased with the rapid response and excellent cooperation among all the scientific groups concerned with this spill, including state and Federal agencies, as well as private groups. Nevertheless, the cooperative scientific response was largely on an ad hoc basis.

All our efforts certainly would have benefited from more comprehensive science planning before the accident. For the past year the University of Rhode Island has been developing plans for a Narragansett Bay Center for the study of coastal marine ecosystems to be located at the Graduate School of Oceanography. Our vision is that this Center will provide a focus for scientific, economic management, and educational activities and that it will serve as a central repository for information about Narragansett Bay and the adjacent coastal waters.

Had such a Center been in place before the *World Prodigy* spill, our scientific response could have been faster and more comprehensive. Co-locating some personnel from the Rhode Island Department of Environmental Management and appropriate Federal agencies at the proposed University Center would result in a unique combination of environment and management-related personnel to address many natural and social science problems of our local estuarine system.

In summary, we are very fortunate the nature of the oil, the location of the spill, the season and the weather all combined to minimize the long term effects. We also had results available to us of earlier University of Rhode Island studies of toxic effects and fate of just this type of oil.

We must be concerned, however, about future disasters where we will not be so fortunate. We must anticipate the occurrence if not the exact nature of these spills here in Rhode Island and we must make adequate scientific plans to be ready.

Thank you.

Ms. SCHNEIDER. Terrific. Thank you very much.

[The statement of Dean Duce can be found at the end of the hearing.]

Ms. SCHNEIDER. And now Ms. Trudy Coxe.

STATEMENT OF TRUDY COXE

Mr. COXE. My name is Trudy Coxe. I am the Executive Director of Save the Bay, Rhode Island's largest environmental organization. On behalf of our 12,000 members, I want to thank both of you very much for not just being here today, but being on the scene of the crime within I think it was less than five hours, and for bringing to Rhode Island some of the most important people in the field of environmental protection, showing that all of America has its eyes focused on Narragansett Bay. That, to us, is very important.

Commendations, too, to Bob Bendick and the Department of Environmental Management for doing a superb job and cleanup; to the Coast Guard for having a plan that they put into effect—and it worked extremely effectively; and also the volunteers.

One of the questions that you asked, Congressman Machtley, before, was how do the volunteer forces for cleanup occur. Save the Bay was asked by the Governor late Saturday afternoon to help not just identify but help direct volunteers to places where cleanup might be needed. We had about 150 calls an hour come in to our office on Sunday, which was a tremendously exciting statement on the part of the Rhode Island public, about what Narragansett Bay means to them, and what they were willing to do.

I am a little bit concerned about what we heard today. I hope that before the end of this morning we will hear from both DEM and the Department of Health about what kind of impact might have occurred to those volunteers, hundreds of them, who went out in the goodness of their hearts to do what they could do to help with the cleanup.

As has been pointed out frequently this morning, Narragansett Bay was lucky last week. We probably have survived this time, but as we breathe a sigh of relief, we must dedicate ourselves to the principle of never again, never again should Narragansett Bay be placed in such peril, never again should we be put in the position to ask if the bay will survive.

If never again, then on board navigation must be improved. Let me preface this by saying that this effort is far more important than all the attempts that have been made in the last ten to twelve years to require double hulled vessels, a process we believe is slow and expensive, and may have questionable benefits.

There is a state of the art technology now, it is available, which would warn Coast Guard and a ship if there were danger. The system would work by using a satellite tracking system called the differential global position system. An on board computer would calculate the position of the ship to within a few yards of its actual position based on signals already being sent by defense satellites. This is a better, more improved system than the LORAN system that was referred to before, because it is much more precise.

With several possible combinations, computerized charts, communication with the Coast Guard, on board monitors, alarms would be sounded both on the ship and at the Coast Guard station nearby if a ship were off course or headed for trouble.

Because the Defense Department has already invested about $12 billion in satellites for the system, it can be implemented now at a fraction of the cost of radar systems. Currently, radar systems cost bout $50 million per Coast Guard station, while the new systems cost only $5.6 million a station, and about $26,000 per ship for the necessary equipment.

The Coast Guard recently prepared a report which recommended this system. It came out in April of 1989. At least one manufacturer is ready to implement the system on a test basis. Save the bay believes that this system has a lot of merit. We are asking both of you to do everything you can to see that Narragansett Bay becomes the first test center for this exciting and affordable new technology.

If never again, then all ship personnel must be well trained. No matter how good a technology, it is worthless unless operated competently. I think the United States can rightfully take pride in most of its maritime crews. Our efforts to certify U.S. crews, however, are undermined by a lack of control over foreign vessels in U.S. waters. So, therefore, international certification, we believe, is necessary.

The vehicle for such control already exists through the 1978 International Convention on the Standards of Training Certification, and Watch Keeping for Seafarers, administered by the International Maritime Organization within the United Nations. We urge you, Congresswoman Schneider, to urge your Committee to push the United States ratification of this international agreement to ensure that all ship crews and captains are qualified.

If never again, then our first line of defense, the Coast Guard, must be given the resources it needs. A larger Coast Guard budget could have perhaps prevented the Alaskan tragedy. If the Coast Guard today had the radar system it had ten years ago before drastic budget cuts were put into place, it could have detected that tanker off course.

The Coast Guard must have funds to be able to inspect vessels more thoroughly and more frequently. More thorough inspections could have prevented, for example, and oil spill on the Chesapeake Bay, where a barge literally cracked in half several days after it was inspected by the Coast Guard. More frequent inspections could perhaps have prevented the spill on Narragansett Bay.

Last time that *World Prodigy* was inspected, it was cited by the Coast Guard for, among other things, having outdated charts. Another inspection could have been made a few hours later here in Providence to ensure that those charts had been purchased and were on board. Such an inspection was not done.

A larger Coast Guard budget would also allow the Coast Guard to develop additional strategic stockpiles and containment equipment in case future accidents occur. These stockpiles are extremely important. They are the most effective and efficient means for ensuring that equipment is available for a spill. Had there not been a Coast Guard station nearby, Narragansett Bay would have suffered far more from the spill. We must not place other areas further from Coast Guard stations in such jeopardy.

If never again, then vessel owners, leasers, and operators and cargo owners must have a vested interest in protecting the environment. Stringent liability is absolutely necessary to ensure that the polluter pays when an accident occurs. Current oil spill liability is controlled by a complex contradictory set of state and Federal laws.

The Clean Water Act, the Outer Continental Shelf Lands Act amendments, the Trans-Alaska Pipeline Authorization Act, the Comprehensive Environmental Response Compensation and Liability Act, and the Limitations on Liability Act, all play a role in determining oil spill liability. You can just see from the list why it is so complicated.

If never again, then a new Federal law is needed, we believe, to provide the national framework for oil spill liability and to provide cleanup funds in the event of a spill. This should include complete compensation to oil spill victims, substantial readily available funds to pay for the cleanup, and limits on legal defense to the spiller.

Legislation of this kind, as you have pointed out, Congresswoman Schneider, has been discussed in the United States Congress since I believe 1975 but has yet to be enacted. We look forward to working with both of you to see that this stalemate is broken once and for all.

As you know, Narragansett Bay is Rhode Island's greatest resource. Working with you over the last few years we have seen tremendous improvements in the by, but on June 23rd all that work was almost for naught. It was almost as though the bay's life flashed before our eyes. Like any victim of a near death situation, we must reconsider our bad habits.

As long as we make Greek tanker captains scapegoats for our problems, we miss the point. That tanker was coming into Narragansett Bay to satisfy our wants. If never again, then, we must stop wasting gas, we must seek alternatives to fossil fuels as though our lives and as though the life of the bay depended on it.

Solar power was just getting off the ground when Federal support for it was cut off. Fuel economy standards have been shamefully relaxed. Individually and collectively, we need to stop wasting and we must dedicate ourselves to ensuring that we are never again this close to the bay's death.

Thank you very, very much for giving us the opportunity to testify today.

Ms. SCHNEIDER. Very fine. Thank you very much.

I will call on my colleague, Congressman Ron Machtley for the first questioning.

Mr. MACHTLEY Thank you very much for your work over the years in the bay and the environment, and the oceanographic areas.

One of the things that struck me was, frankly, how primitive our response to oil spills is in terms of technology equipment, physical equipment, booms. I mean, when I was a kid I used to try and dam up the stream going down the street with a cement block, and it really is a primitive way. Is there any technology over the horizon, such as emulsions or something we could spread out over these environmental safety areas to protect them? I mean, are we just limited to physical barriers?

Dean, do you have any knowledge?

Mr. **Duce**. Probably Dr. Spaulding can answer this better. This is a serious problem. There hasn't been significant use in some 20 years, as was mentioned earlier. The ocean is quite variable in this sea state. When you get waters that are rough, it is very, very difficult, and in fact with present technology, almost impossible to contain anything when the waters get very rough.

Certainly I think a very important part of this has to be the prevention of the spills, first of all, the double hull in tankers are an extremely important part of that. I suppose there are other ways to solve those problems.

Maybe Malcolm, you can answer that better than I.

It will be difficult and probably expensive.

Mr. **Spaulding**. I think you have to look at the spill responses in two roles. One is, the best response is to contain the spill It is like a pile of leaves on the lawn. Once they blow all over your lawn they are hard to clean up. It is quite easy however to take care of them while they are in a pile. It is the same thing with oil, only more so.

Here is a little tanker 500 feet long, should you have a spill, an area of 123 square miles is covered in oil in a period of three days. If you want to control the spill it has got to be at the source. In terms of equipment, the oil spill containment business; skimmers, booms, barriers, surfactants, dispersants, and emulsifiers, have had a sporadic pattern of development.

An oil spill will spur on development. Three years later development stops. EPA had a widely known laboratory to perform research on oil spill skimmers, booms, and barriers. Three years ago they went out of business for lack of support. I predict that right now they will be back in business.

One has to look at spill response not only in terms of just responding with some particular piece of equipment, but in the larger context. In many cases, equipment is available if it can be correctly configured for the area.

Bob Bendick made a very good point. What you really ought to do is make a barrier that works in the Narrow River. You certainly could go out and check the performance of that barrier before any spill ever occurred, have the anchors in place, know the deployment procedure, and have an appropriate barrier system available, if not locally, at least regionally.

Those kinds of things are amenable to planning. It is an integrated viewpoint, integrating the management system that you have with the equipment that you have to respond to the event. I think that is the key to success here.

Ms. **Schneider**. If the gentleman will yield, I would like to pick up on a point that you mentioned, about pushing for the continuation of funds for many of the projects that we have discussed this morning, and then realizing that to a great degree, many of those funds have been depleted over the years.

Now, of course, as you all know, you are seeing crisis management on the part of Congress. Everybody says spend money for this, spend money for that. Would not the Sea Grant program be the appropriate source of funding to look into site specific designs for booms? Or is there a better place within the Federal Government that you know of where we would not have overkill and duplication of funds?

Mr. SPAULDING. The problem is in the oil business, as in the legislation responding to it—there are as many pieces of legislation as there are Congress people, as far as I can see, that respond to oil. I think in terms of oil spill research, you see the same thing. We would be much better off focusing our resources and collectively focusing them on addressing the problem rather than spreading them out because of the interagency battles that occur. Whether the Department of the Interior, EPA, NOAA, or the Sea Grant program, is the most appropriate vehicle isn't quite clear.

What is clear is that those groups ought to have an integrated approach and there ought to be a sustained effort. Not three years in the business and decide, well, we haven't seen any major oil spills in three years, we are getting out.

The four spill events are unprecedented in U.S. oil spill history in terms of their magnitude and their timing. The key to the response business is to sustain the effort. To continue to design, to use, and develop realistic operational, contingency plans in the states. To have those plans so that they can be implemented for these disasters.

Ms. SCHNEIDER. OK.

Mr. MACHTLEY I just had two other points I wanted to make:

First, I think it is very easy for us to be lulled into thinking that this may be our last mishap in the Narragansett Bay since it just recently occurred. We have had seven mishaps since 1969 in the Narragansett Bay. I think the message ought to go out to people that we need to work quickly. We cannot assume it will be next year or five years or four years.

I hope that in the rest of Rhode Island and the ASA that you will put together a report analyzing this response so that everyone will have something that they can quickly respond to and that Save the Bay would sue their expertise to give us something that we could respond to if necessary, even next week.

The other issue I think is, it is my understanding that while 450,000 gallons of oil at one time was an enormous amount of oil to spill, that that is only a portion, or less than we have going into our pristine waters on an annual basis. Can one of you confirm that? We are dealing with more pollutants into our bay than we just saw?

Mr. DUCE. I can certainly confirm, and I am sure Trudy can even better probably, that the quantity of oil that was spilled in this spill is approximately equal to the quantity of oil and hydrocarbons that comes into the bay from a variety of sources almost everyday.

Mr. MACHTLEY. Everyday?

Mr. DUCE. For a year, but it is coming in everyday. Some small fraction is coming in everyday. Here we had an acute situation where we had a tremendous amount of oil all at one time. What we have during the year is smaller amounts of oil coming in essentially everyday, through sewage, especially when you have heavy storms, runoff, et cetera. The total quantity coming into the bay is roughly the same as we had in this spill.

In addition to that, there are many other toxic materials besides oil coming in.

Mr. **Machtley** I wanted to comment on Trudy's idea of using the military satellite. I will ask the House Armed Services Committee to begin looking into whether we can utilize military technology for surveiling tankers. Hopefully, we will find out in the next couple of weeks.

Dean Duce, you had mentioned in your testimony the need for comprehensive science planning. Once again, in the ideal world, how would you see us designing a comprehensive science planning effort so that if and when another oil spill should occur, we are better prepared to deal with it from the scientific point of things?

Mr. **Duce**. One can look at this in two frameworks. One is the local framework in Rhode Island and Narragansett Bay. The other, of course, would be the national framework. Obviously, it is much easier to address problem on the local scale. We were very fortunate here in Rhode Island because we are a small state and most all of us that are concerned with the bay and work in the bay knew each other, so it was not that difficult to at least get everyone together, as Dr. Jaworski and others indicated, very rapidly after the spill.

We developed a plan, but it was an ad hoc plan. I think it would be very easy for us here in this state to get the same people together again, Federal, state, government, and determine what kinds of equipment we need, what kinds of expertise we need, what kind of facilities we need, that we don't have, for a variety of types of environmental emergencies, such as an oil spill, and then lay out our plans. We could do this within a few weeks, I think. Then when the next spill comes, when the next emergency comes, as it undoubtedly will, we are ready to move right ahead.

I think locally this is very doable. On a national scale it is more difficult to do. I don't think there is any question about that. I think one of the things that we have concern with in terms of the environment, whether it is local or national, is that we had very little information on what the impact of a wide variety of pollutants that get put into the marine environment really are on the marine environment.

We were very lucky, as I mentioned before, that we have been doing studies here on the effects of just this type of oil over the past several years, but that is a rare, unique type of data set for one type of pollutant. I think we need to expand nationally the types of research necessary to evaluate the impacts of a whole range of material that gets accidentally, and sometimes intentionally, put into the ocean, what those impacts are on the marine ecology system.

Ms. **Schneider**. Well, this was primarily part of the reason for the conceptualization and implementation of the Narragansett Bay and the Chesapeake Bay projects, and as you know, I have had a hearing scheduled for July 31st on the Narragansett Bay Project, where we will be hearing more about the various types of evaluations of the whole range of toxics that are being dumped into our bay, so we will have closer review of that and see what its amplifications might be nationwide.

So I am very grateful that we were able to hold yet an additional hearing today to look at some other aspects of how we can take the

Rhode Island model, improve upon it for our own purposes, and then extend it throughout the United States.

I think that the point you make that we can do in this state, a good comprehensive science plan, is absolutely true, having been present in the room as the scientists from EPA and yourself and others were all pulling together to determine who would provide the focus here, and how it would happen. I was very impressed by the synergism that took place, and you and all the others are to be commended on that.

I do know that it would not happen so well in other states, and so I think this, too, is a consideration that perhaps I should look at in this contingency plan, that it would conclude there are not only responses but also the capability for scientific monitoring on an ongoing basis as a result of the spill.

So the testimony that all three of you have shared with us today has been quite fine. If there are any closing comments or additional points you would like to make, please take that opportunity now.

Anything else to add?

No? Well, Congressman Machtley and I thank you all very much for your hard work in helping Rhode Island to deal with the crisis and also we thank you for your future oriented input on planning for any other crises in the future. Thank you very much.

Mr. MACHTLEY Could I just say for the record, I can't imagine a state which could have better people involved in protecting our environment than what we have seen today, and what we know is available. All these panelists are clearly experts in their fields. We are so fortunate to have their abilities and their willingness to come here. It makes me very proud to be a Rhode Islander.

Ms. SCHNEIDER. Absolutely.

On that positive, upbeat note, the Subcommittee on Oceanography and the Great Lakes stands adjourned.

[Whereupon, at 11:45 a.m., the Subcommittee was ajdourned, subject to the call of the Chair.]

[The following was submitted for the record.]

PRELIMINARY REPORT OF NATIONAL MARINE FISHERIES SERVICE RESPONSE IN RELATION TO THE OIL SPILL IN NARRAGANSETT BAY

Dr. Kenneth Sherman
Narragansett Laboratory
NOAA, National Marine Fisheries Service
Northeast Fisheries Center
July 3, 1989

This is a preliminary report of the oil-spill-response-evaluation of fisheries resources at risk from the *World Prodigy* grounding in Narragansett Bay.

1. Sequence of Response

I made initial contact was made by with Mr. Ken Finkelstein (NOAA ON-Site Coordinator) and with Mr. Gary Ott (NOAA/Coast Guard coordinator) on Saturday, 24 June. They concurred with the decision of the NMFS Region/Center to conduct an operation to assess oil spill damage on fisheries resources at risk using a sampling strategy based on the effects of the oil on the fish eggs and larvae, as they are the stages most sensitive to oil in the surface waters.

Sampling was conducted both in the oil slick and in coastal areas outside of the slick area from 6 A.M. through 8 P.M. on Saturday, 24 June, and 6 A.M. through 9 P.M. on Tuesday, 27 June.

I met with the members of the NOAA Response Team on Sunday morning and participated with them in reporting the results of: (1) the NOAA spill damage assessment effort, and (2) oil trajectory monitoring effort to a group of assembled scientists, resource managers, legislators, and press assembled on the Bay Campus of the University of Rhode Island. Arrangements for the meeting were made by the State of Rhode Island and the NOAA Response Team (Finkelstein and Ott).

Mr. Ott and I attended a research coordination meeting at URI on Sunday afternoon, where it was agreed that additional scientific observations would be required to estimate the extent of potential and actual oil spill damage.

A meeting of the NOAA On-Site Coordinators and NOAA General Counsel was held at the Narragansett Laboratory on Tuesday, 27 June, at 8 A.M. to review events from Friday, 23 June, through Tuesday, 27 June, and review the NOAA policy as enunciated from Bud Ehler (NOAA/OAD) through the NOAA Response Team with regard to damage assessment issues. This group then participated in a meeting of scientific and legal advisors from involved Federal and State agencies on the Bay Campus of the University of Rhode Island. The meeting was arranged by Carolyn Karp of the State of Rhode Island who was appointed by the Governor of Rhode Island to serve as the coordinator of the State damage assessment team.

At the request of Ms. Karp, a written report of the NOAA/Fisheries scientific effort in response to the spill was prepared and made available to her. A copy is attached.

The response to the oil spill by scientists, policy staff, managers, legislators, and the public was overwhelmingly positive. The scientific community at URI is among the strongest in the country given the expertise at the Graduate School of Oceanography, EPA, and NMFS. Although it is early in the process of assessing damages to the resources, the local scientific community is in a position to do a rapid and effective job.

2. Damage Evaluation to Fisheries

The damage inflicted on fishery resources from any spill is dependent on the areal and temporal extent of the spill and the toxic effects of the substance. In the case of the *World Prodigy* grounding and spill, the timing from a fisheries productivity perspective could hardly have been worse. The spill occurred during an annual peak in the natural production of the Bay. Many fish species were spawning and their fish eggs and larvae were abundant in the waters of the entrance to the Bay where the grounding occurred. The zooplankton populations that serve as food at the base of the food chain for larval fishes and lobsters were swarming throughout the area sampled, both in the surface and subsurface of the oiled waters, as well as in the adjacent areas sampled that were uncontaminated by oil.

The species at risk from the spill were estimated from examination of 20 percent of the samples collected by NMFS. The species present in samples included eggs and larvae of butterfish, mackerel, scup, tautog (blackfish), cunner, silver hake (whiting), white hake, menhaden, anchovy, goosefish (angler fish), searobin, rockling, small species of flounder, lobster, crabs, and their zooplankton prey.

In samples collected from the surface slick we observed moribund and dead larval fish, lobsters, crabs, and opaque fish eggs.

In the surface samples from the adjacent oil-free water, we observed the same species. However, they were vigorously moving following capture and were in a healthy state based on visual examination by microscope on the deck of NOAA's research vessel *Gloria Michelle*.

No evidence of moribund or dead eggs, fish larvae, lobster larvae, or on their zooplankton prey were observed in any of our collections of Tuesday, 27 June, made over the same region as the prior sampling of Saturday, 24 June.

We are now in the midst of a quantitative assessment of the impact of the oil on larval fish and zooplankton. The results will be made available following a detailed quantitative analysis.

UNITED STATES DEPARTMENT OF COMMER
National Oceanic and Atmospheric Administra
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Center
Narragansett Laboratory
South Ferry Road
Narragansett, RI 02882-1199

June 26, 1989

MEMORANDUM FOR: Distribution

FROM: Ken Sherman

SUBJECT: Oil Spill Response

The National Marine Fisheries Service, Northeast Fisheries Center, scientific team sampled the area impacted by oil on Saturday, June 24, using two strategies:

1) sampling under the oil, and

2) sampling at the air/sea interface in the oil slick.

The objective of the scientific response was to determine quantitatively the extent of impact of the oil spill on the early developmental stages of the fisheries resources at risk. Observations were made during daylight hours from NOAA's R/V Gloria Michelle, stationed at Davisville, Rhode Island. The NOAA Corp officers and fisheries engineers were assembled shortly after the notice of spill was received and went to sea at 6:00 am on Saturday, June 24.

Preliminary Results

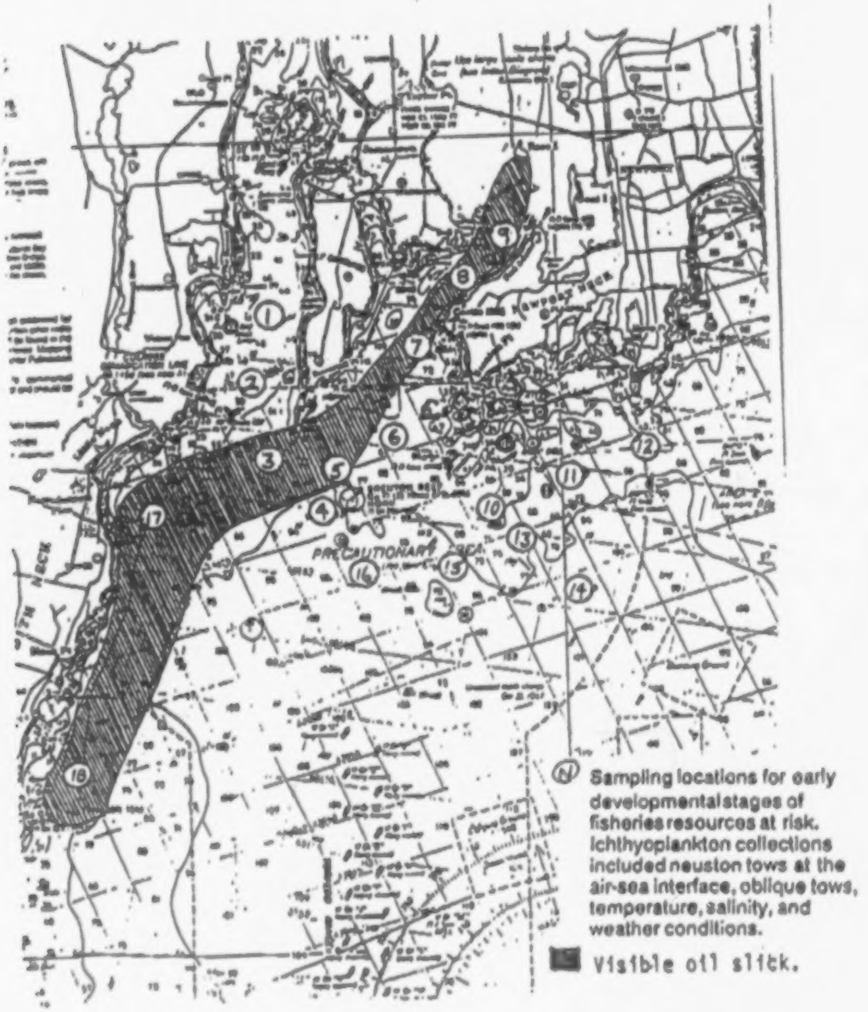
Samples collected from beneath the slick and within the slick show evidence of significant mortalities of early life stages of tautog (blackfish), cunner, scup, sea robin, larval lobsters, and several other species. In the areas sampled outside of the slick zone, the same species were found in a healthy condition. There was evidence of widespread spawning activities among all the species observed and high biological production of their zooplankton food. Evidence of dead and dying zooplankton was also observed through direct microscopic examination made at sea. In the water free of any evidence of oil contamination, both the zooplankton food of fish larvae and lobster larvae were in healthy condition. The larval lobsters, larval fish, and fish eggs collected from the oil free water also appeared to be in a healthy state.

The preliminary results of the initial sampling suggests that with the expected rapid evaporation and weathering of the oil, relatively rapid repopulation of the impacted areas will likely occur.

The Northeast Fisheries Center of the National Marine Fisheries Service will conduct a second survey of the oil spill region on Tuesday.

Personnel participating in the study were: Kenneth Sherman, John Green, Ken Barton; Alan Blott, Glen Gioseffi, Thomas Halavik, John Kenney, Vernon Nulk, and Jerome Prezioso.

Oil Spill Area - Sampling Pattern


1
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PRECAUTIONARY AREA
NEWPORT NECK

Ⓝ Sampling locations for early developmental stages of fisheries resources at risk. Ichthyoplankton collections included neuston tows at the air-sea interface, oblique tows, temperature, salinity, and weather conditions.

▨ Visible oil slick.

STATEMENT OF
DR. NORBERT A. JAWORSKI
DIRECTOR ENVIRONMENTAL RESEARCH LABORATORY-NARRAGANSETT
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON OCEANOGRAPHY
COMMITTEE ON MERCHANT MARINE AND FISHERIES

NEWPORT, RHODE ISLAND
JULY 5, 1989

Good morning. I am Norbert A. Jaworski, Director of EPA's Environmental Research Lab which is located in Narragansett, Rhode Island. I am accompanied by Dr. Gerald Pesch, Acting Branch Chief of the Biological Effects Branch and a Research Aquatic Biologist. I am pleased to be here to testify on the results of the monitoring of the World Prodigy oil spill in Narragansett Bay.

The Environmental Research Laboratory-Narragansett (ERLN) was contacted on the evening of June 23, 1989 by an EPA Region I representative requesting technical assistance with the initial assessment phase of the World Prodigy oil spill. In response, we brought a staff team together early Saturday morning, June 24, to accomplish two objectives; 1) conduct a reconnaissance sampling survey of the impacted region, and 2) produce chemistry and biological effects data sufficient for an initial assessment of environmental damage. These efforts were coordinated with the Office of the Governor of the State of Rhode Island, the Narragansett Bay Program, the staff of the University of Rhode Island's Graduate school of Oceanography and School of Ocean Engineering.

Selection of station locations for the survey was done jointly by Dr. Malcolm Spaulding and the staff of ERLN to facilitate joint use of EPA chemistry data. Dr. Spaulding will use these data to check performance of dispersion models. ERLN will use these data to "finger print" the oil specifically to the World Prodigy and to provide measured concentrations along a transect of Narragansett Bay.

Sampling began at high tide so that the extent of the oil spill into Narragansett Bay (as of Saturday afternoon) was documented. These samples were taken below the surface so as to measure oil being incorporated into the Bay water. Water sampled from selected stations was returned to the Laboratory for chemical analysis and for toxicological assessment. A suite of short-term bioassays was used to test for biological damage associated with oil concentrations in the water.

Samples were also taken on Saturday afternoon by a diver at a station immediately south of the World Prodigy for the purpose of profiling oil concentrations with depth. The intention was to provide, by Sunday, June 25, data sets of oil concentration in seawater and consequent toxicity linked directly to the World Prodigy spill. This sampling is being followed over time to trace short-term changes in Narragansett Bay due to the spill. Samples were taken at the same stations on Saturday, June 24, Sunday, June 25 and Wednesday, June 28, and are being taken today, Wednesday, July 5. Samples were taken also in Narrow River and at the seawater intake structures for the ERLN and for University of Rhode Island's GSO.

In addition to the assessment of water column exposures in Narragansett Bay as a consequence of the World Prodigy spill, ERLN has also responded to a report of oil contamination on lobster and lobster pots. At the request of Caroline Karp, who is coordinating the environmental assessment efforts for the State, ERLN sent a marine chemist to investigate this report. Samples from the lobster pots and lobsters as well as observations proved negative for oil contamination.

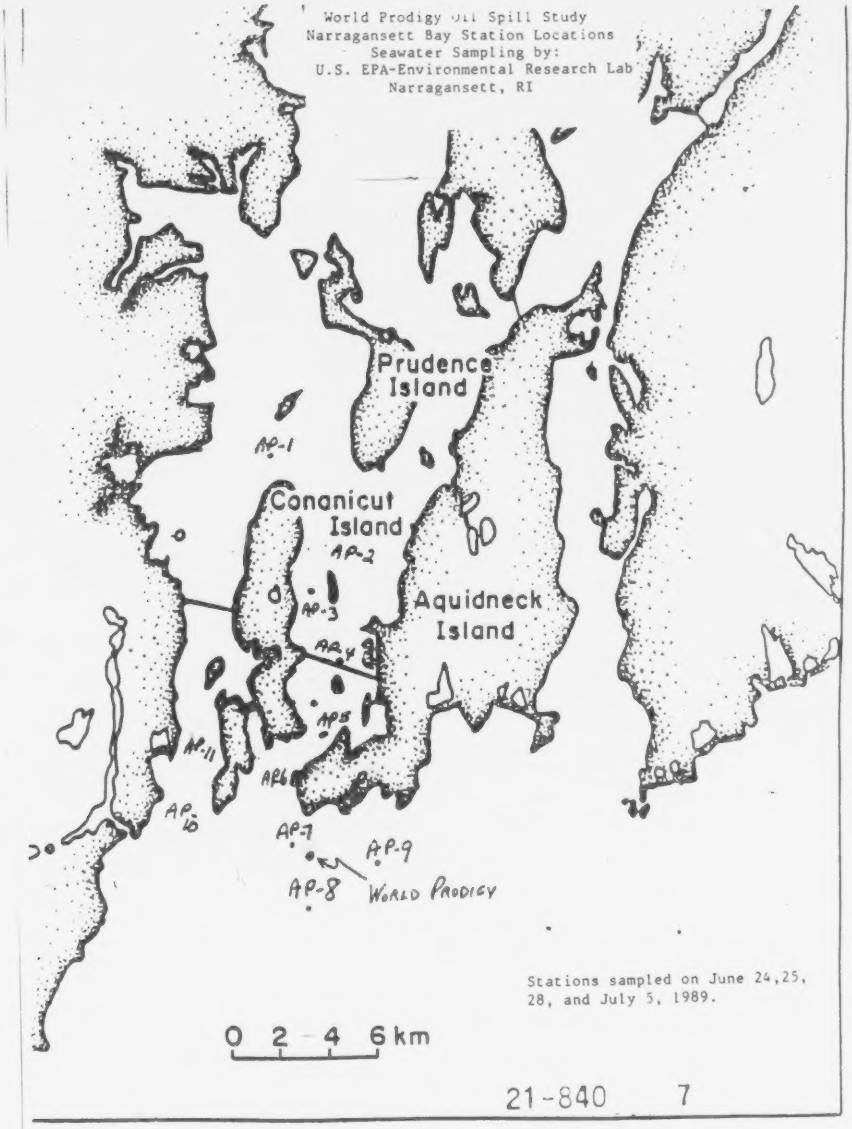
Mr. Chairman, we have maintained chain of custody records for all samples.

Finally, I can report that the State of Rhode Island is coordinating a shoreline survey. Two staff members of the ERLN are participating in an assessment of short and long-term damage to the large, attached marine plants found along much of the Rhode Island coast contaminated by the oil spill.

In summary, our initial findings indicate that very little of this oil was mixed into the seawater. Most of it remained on the surface. There was some immediate toxicity associated with these low levels of oil. These effects were short-term. By Wednesday, June 28, they were minimal. These results are consistent with observations of the National Marine Fisheries Service and the University of Rhode island. The impacts on some shoreline areas may be longer term. We are participating in the shoreline surveys to follow recovery from these effects.

This concludes my prepared statement, Mr. Chairman. I have attached for the Subcommittee's information materials referencing the station locations for the survey conducted, a list of water samples, summaries of the chemistry and toxicity data, and preliminary findings of the shoreline survey. I would be pleased to answer any questions that you or the members of the subcommittee may have.

World Prodigy Oil Spill Study
Narragansett Bay Station Locations
Seawater Sampling by:
U.S. EPA-Environmental Research Lab
Narragansett, RI


Prudence Island
AP-1
Conanicut Island
AP-2
AP-3
Aquidneck Island
AP-4
AP5
AP-11
AP6
AP-10
AP-7
AP-9
AP-8
WORLD PRODIGY
0 2 4 6 km

Stations sampled on June 24,25, 28, and July 5, 1989.

21-840 7

World Prodigy Oil Spill Study
Narragansett Bay Seawater
Samples analyzed by:
U.S. EPA Environmental Research Laboratory
Narragansett, RI

Date Collected	Station	Concentration (ppm)
24 June 1989	AP-1A	ND
	AP-4A	ND
	AP-5A	2.1
	AP-6A	0.25
	AP-7A	0.25
	AP-8A	4.3
	AP-8B	2.5
	AP-8C	0.30
	AP-8D	0.50
	AP-9A	0.10
	AP-10A	ND
	NARROW R.	ND
	EPA DOCK	ND
	EPA MEZZANINE	ND
25 June 1989	AP-1A	ND
	AP-4A	ND
	AP-5A	ND
	AP-6A	1.3
	AP-7A	1.0
	AP-8A	ND
	AP-8B	ND
	AP-9A	1.2
	AP-10A	0.20
27 June 1989	EPA Mezzanine	ND
	GSO Dock	ND

ND = Below detection limit of 0.05 ppm

World Prodigy Oil Spill Study
Samples Collected by Surface
Wipes of Lobsters and Lobster Pots
West Passage, Narragansett Bay
June 27, 1989

28 June 1989	Anawam Cliffs	
	*Lobster 1	ND
	*Trap 1	ND
	S of Anawam Cl.	
	*Lobster 2	ND
	*Trap 2	ND
	Jones Ledge	
	*Lobster 3	ND
	*Trap 3	ND
	Bonnet Cliffs	
	*Trap 4	ND
	S. of Bonnet Cl.	
	*Lobster 5	ND

* = These samples are physical wipe tests of lobster traps or lobsters contained therein.

ND = Below detection limit of 0.05 ppm

World Prodigy Oil Spill Study
Preliminary Toxicity Test Results on
Narragansett Bay Water Samples
U.S. EPA Environmental Research Laboratory
Narragansett, RI

ORGANISM	NARRAGANSETT BAY WATER SAMPLES	OIL SAMPLES
Sea Urchin Arbacia punctulata		
Gametes	No evident toxicity	No fertilization at 2.5 ppt[b]
Embryos	Growth effects 6,7,9 (6/25)	Survival effects at 0.5 ppt[c] Growth effects at 0.1 ppt[c]
Macroalgae Champia parvula	No effect with 6/24 and 6/25 samples	Not yet performed
Laminaria saccharina	No acute effects, too early to tell about reproductive effects	Not yet performed
Fucus sp.	Reproductive effects at 3,4,6,7,8,&9 (6/24), tests with plants collected on subsequent days inconclusive	Not yet performed
Mysid Mysidopsis bahia	Apparent survival effects at site 5 (6/24)	

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[a] Water sampling dates were 6/24, 6/25, and 6/28

World Prodigy Oil Spill Study
Preliminary Toxicity Data - Large Plants
U.S. EPA Environmental Research Laboratory
Narragansett, RI

Champia parvula (Red alga)
Laboratory cultures were exposed to samples collected on 6/24/89, 6/25/89 and 6/28/89 from all nine east passage stations. There is no evidence of acute toxicity (i.e. no sign of necrotic tissue) from any of the exposures. All of the data on reproductive effects are not in yet. The preliminary analysis of the data indicates that there is no significant effect on sexual reproduction due to oil from samples collected on either the 24th or 25th.

Laminaria saccharina (brown alga, kelp)
We exposed laboratory grown gametophytes of this species to water samples from all nine sites. Fresh gametophytes were used for the 6/24/89 samples, and reproductive material was used for the 6/25 and 6/28 samples. It is too soon to assess any reproductive damage, but there is no evidence of any acute effects.

Fucus spiralis (brown alga, rockweed)
Reproductive material was collected from just south of the Narragansett state pier prior to the arrival of oil on 6/24/89. Release of gametes was induced in the laboratory during exposure to all nine east passage samples collected on 6/24/89. Germination was significantly inhibited by exposure to water samples collected from stations AP-3, AP-4 and AP-6 through AP-9. No significant inhibition occurred at station AP-1 and approximately 50% inhibition from the sample at stations AP-2 and AP-5, as compared to "in-house" control water. Results using material collected on subsequent days from this same site are inconclusive due to poor germination in the controls. This poor response is possibly due to the oil that arrived at this site after the first collection was made.

Sexual reproduction in *Fucus* has been shown in the past to be sensitive to petroleum products. This sensitivity has been related to the fact that the motile sperm is attracted to the non-motile egg by a phermone. Apparently the ability of the sperm cells to detect the presence of the phermone can be interfered with quite easily by low concentrations of oil. *Champia* has no such phermone system for attracting gametes to one another, and this may in part explain its lack of sensitivity to the fuel oil present in the east passage samples.

World Prodigy Oil Spill Study
Preliminary Report on Shoreline Survey Results for Seaweed Impacts from Oil Spill

U.S. EPA Environmental Research Laboratory
Narragansett, RI

Summary: No visable evidence of damage to attached plants in the intertidal and upper subtidal region of the shoreline, with the possible exception of a few species localized in tide pools at one heavily oiled site (Hull cove) on Jamestown Island. Reproductive inhibition has been observed with two intertidal species, *Fucus vesiculosus* and *Fucus spiralis*

On 6/26/89 and 6/27/89 we surveyed and photographed eight rocky shore sites for the purpose of determining the extent of damage to intertidal and upper subtidal species of marine macroalgae. The sites and dates of visits are listed below. In addition we collected reproductive material of the brown algae, *Fucus vesiculosus* and *F. spiralis*, from several sites. Sexual reproduction by *Fucus* is known to be very sensitive to petroleum products.

Location	June Date Visited
Narragansett sea wall and state pier	24th prior to oil, 25th. and 28th
Camp Varnum	26th
Jamestown Island	
jetty opposite Bay Voyage Inn near the base of the Newport Bridge	26th
Ft Weatherall*	26th and 29th
Mackeral Cove	26th and 27th
Hull Cove*	26th and 27th
East side of Beavertail	26th, 27th and 29th
West side of Beavertail	27th and 29th

*Oil still very much evident on the seaweeds from these sites on 6/26 and 6/27

With the exceptions listed below, there has been no evidence of necrotic tissue among the attached plants in the intertidal and upper sub-tidal areas at the sites visited. The amount of dead material in the drift is not abnormal. Photographs were taken at most of the above sites and will be followed up next week with additional photographs to determine if there is any "time lag" in the effect of the oil.

Possible exceptions:
East side of Beavertail--There was a lot of necrotic tissue on the green alga, *Ulva lactuca*, from the high intertidal rocks. This could have been a natural sunburn effect or massive release of reproductive spores, but was not evident on the less-oiled west side of Beavertail. Even if this was due to the effects of the oil, the damage was not wide spread and *Ulva* is capable of rapidly recolonizing vacant areas.

Hull Cove: At low tide on 6/27/89 this site had three species that may have been effected by the oil. This site still had evidence of the presence of oil in the sediments. The green alga, *Spongomorpha lanosa*, was found both in tide pools and exposed on the algal covered rocks. The material in the tide pools appeared to be discolored (a much lighter green), and will be checked again next week to determine if it died. The tips of the red alga, *Dumontia incrassata*, were also discolored and appeared necrotic. This species was found in the same tide pools as the *Spongomorpha*. Another species of red algae, *Chondrus crispus*, is found in the upper sub-tidal areas attached to rocks. We found several necrotic founds attached to the rocks at Hull Cove, it is too early to say if the damage will be more extensive. This site will be revisited in the weeks to come.

Reproductive Tests:
Fucus vesiculosus was collected from four of the above sites. Reproductive material was collected from the state pier at Narragansett on 6/24 (prior to the arrival of the oil) and again on 6/25 and 6/28. The 6/24 material released large numbers of gametes, with a germination rate of approximately 65%. The material collected on 6/25 release fewer gametes with no germination. We have not completed the germination test for the material collected on 6/28. Reproductive material collected from the jetty opposite the Bay Voyage Inn, Ft. Weatherall, and Hull Cove (all on 6/26) released little or no gametes with no germination. These reproductive tests will be continued to determine when normal germination rates return.

TESTIMONY
ON
WORLD PRODIGY OIL SPILL
BEFORE
HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES MANAGEMENT

Robert L. Bendick, Jr.
R.I. Department of Environmental Management
July 5, 1989

My name is Robert L. Bendick, Jr., and I am the Director of the Rhode Island Department of Environmental Management. I wish to thank Congresswoman Schneider for holding this hearing on the World Prodigy Oil Spill and Congressman Machtley for attending.

First, I want to introduce John Stolgitis, Chief of the DEM Division of Fish and Wildlife and Caroline Karp, Executive Director of the Narragansett Bay Study who have joined me to answer questions you may have. Caroline has also been appointed by the Governor to coordinate the State's scientific and monitoring work for the oil spill with the objective of understanding short and long term impacts and assessing natural resources damages.

Before talking about the impacts of the spill and the lessons it holds for us, I also want to thank those groups and agencies who DEM worked with in dealing with the spill including the Coast Guard, the University of Rhode Island, Save the Bay, the Department of Corrections, the R.I. National Guard, the U.S. Fish and Wildlife Service, NOAA, the Environmental Protection Agengy and the Federal Drug Administration. The teamwork and cooperation exhibited by these agencies was outstanding and resulted in our mutual success in limiting the environmental damage from this incident.

Over the Fourth of July weekend I visited the coves and beaches in Jamestown which were most severely affected by the oil. The creatures of the inter-tidal zone - crabs, mussels, barnacles and related species were all dying. There remained a smell of oil in the air. This damage to a healthy coastal ecosystem was frightening and made me realize the scope of the disaster which would have been if the World Prodigy had broken up and all its cargo had been released into the Bay. Only a combination of speedy and effective response efforts and luch prevented this from happening.

Nevertheless, the spill did have significant impacts:

1. Plankton in the surface layer of water in the area of the spill were killed by the oil. This included larvae of numerous species. Lobster larvae may have been most affected.
2. The inter-tidal zone in Jamestown and along the Narragansett shore was most severely affected. Mussels, barnacles, other invertebrates have been largely killed.
3. The bottom of the bay does not seem to have been impacted because the oil was light and floated on the surface. But juvenile lobsters have been killed, probably in shallow water. Reports or oil sinking to the bottom have been checked out and cannot be confirmed.
4. Impacts on birds have been limited, but there is concern about the piping plover, an endangered species nesting on Moonstone Beach. A small amount of oil did reach Moonstone. Several plover chicks have died but it is not clear whether this resulted from the activity surrounding the spill or the oil itself.

In general, oil disappeared rapidly from the Bay's waters, but at the time of this hearing its long term impacts are not clear. Monitoring and analyses are needed to determine long term effects.

The oil spill also had potential and actual impacts on human health. As you know, Number 2 fuel is a toxic substance. The State was extremely conservative (some way too conservative) with its shellfishing and beach closures, this we do not believe the general public received any significant exposure through swimming in oily water or eating contaminated shellfish. We are, however, concerned about two human impact problems:

1. Given the volatilization of large amounts of oil during the early part of the incident, people on Aquidneck Island in Narragansett Bay and in Jamestown were exposed to petroleum vapors. This evidently has caused at least temporary respiratory problems among a number of citizens. It is important that the Department of Health document those problems.
2. It is clear that cleanup workers were exposed to varying levels of oil in the cleanup process. While fortunately the duration of intensive cleanup activities (and these exposure times) was short, the Department of Environmental Management is concerned about health impacts of exposure.

Thus, though the World Prodicy spill was limited in actual impacts, it suggests important policy lessons for the future.

These include:

1. Keeping the Oil on the Ship

   Had the amount of fuel oil contained on the ship been released into Narragansett Bay, no amount of teamwork could have avoided severe environmental damage. Once the oil has spilled, technology and reality prevent effective containment. Several measures should be taken to better avoid tanker incidents:

   a. Tanker captains must be more closely regulated by appropriate international agreements. I believe captains should be subject to the same kind of ongoing training, proficiency testing, and rigorous monitoring as are airline pilots. We should also be acutely concerned about the tugboat captains who pilot the very large numbers of oil barges traversing the Bay.

   b. Loran and other modern navigational devices should be modified to include programs for entrance into each port which include warning and alarm systems for faulty approaches.

   c. The recent pattern of oil spills is not an accident. It reflects a lack of responsibility on the part of ship owners. Insurance and collective liability schemes should not insulate owners from financial and legal liability for spills. Until corporations and their executives are penalized severely, they will not take sufficient steps to prevent accidents.

d. We still depend too heavily on foreign oil. More tankers mean more opportunities for accidents. Programs to reduce oil dependencise should be revised.

2. Cleanup Technology

Once a spill has occurred cleanup technology is not sufficient to contain, divert or dissolve the oil. The Federal government, must and the oil industry must, resume cleanup research. Biological controls may have potential. Booms and skimmers can clearly be improved. Methods of patching or sealing punctured ships should also be explored.

3. Preparedness

The Coast Guard and the State of Rhode Island were reasonably well prepared for the World Prodigy spill, but this incident has revealed that more can be done.

a. Containment booms should be spedivically engineered and constructed for the entrances to the most important salt ponds and tidal rivers. the strong currents in these areas make it difficult or impossible to install and keep in place conventional booms.

b. Containment booms and effective skimmers must be stockpiled at several locations along each coast for airlifting to spill sites.

c. The Rhode Island Health Department must be made part of the initial response team. Protective clothing for cleanup workers should also be stockpiled and safety instructions for volunteers and employees should be prepared in advance.

d. Research and monitoring should be made immediately eligible costs when a spill is federalized so that response activities can be guided by accurate scientific information.

On Friday night, June 23, it seemed like the tanker World Prodigy was near sinking. Through the collective will of the Coast Guard, its contractors, DEM and other experts, that unthinkable event did not occur. We cannot, however, count on such effective intervention after an accident. We must take the steps noted above to insure that the world's oil industry assumes far greater responsibility for tanker safety. And, finally, we must also take care of our day-to-day use of petroleum products, because it is estimated that each year we Rhode Islanders allow us much oil as was released in the World Prodigy spill to enter Narragansett Bay from sewers, storm drains and overland runoff.

RLB/ms

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ARTHUR A. COIA
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Testimony
of Ronald M. Coia,
Business Manager and Secretary-Treasurer,
Local 271, Providence, R.I.,
Laborers' International Union of North America,
Presented to
U. S. House of Representatives
Committee on Merchant Marine and Fisheries,
Subcommittee on Oceanography and the Great Lakes,
Dennis M. Hertel, Chairman,
Newport Hearings
5 July 1989

Good Morning, Congressman Hertel and Congresswoman Schneider. My name is Ronald M. Coia. I am Business Agent and Secretary-Treasurer of Local 271, in Providence, of the Laborers' International Union of North America (LIUNA). I am speaking on behalf of LIUNA's 2,400 construction workers in three of our Locals in Providence, Westerly and Newport, and our 500,000 members throughout the United States and Canada.

Accompanying me is Dr. Knut Ringen, Director of the Laborers' National Health and Safety Fund, a joint LIUNA-management initiative. Through the Fund, LIUNA is actively involved nationwide in worker health and safety issues.

Our union is here today because we are concerned about the health and safety of oil spill cleanup workers. In addition to the National Health and Safety Fund's medical and technical insight, LIUNA brings to this issue its nationally recognized expertise in hazardous-waste worker training. More than 2,500 such workers graduate annually from LIUNA's 80-hour course in New England and nationwide.

For the past three months, in Alaska, the union has worked, with some success, to see avoidable hazards lessened and training improved for the Exxon Valdez cleanup workers. We sent a team of four public health experts to assess the working conditions in April. The team was headed by Dr. Eula Bingham, a former director of U.S. OSHA and an expert on the carcinogenicity of petroleum; the report is attached. LIUNA has continued to meet with Exxon and state and federal officials.

Still, those who have helped clean up oil spills in Alaska, in Narragansett Bay and elsewhere--without training and protective gear--continue to be at risk for long-term health problems.

Despite what some may believe, extensive contact with oil is hazardous, whether the oil be thick Alaska crude or the lighter, refined oil that was in the World Prodigy's hold.

The hazards are different, but no less severe for those handling refined oil. The lighter oil may release materials into the air for a shorter period of time than does crude, but these still are toxic chemicals. They include benzene, a powerful cause of leukemia in people. The inhalation of fumes, skin contact with oil or swallowing of petroleum products are all harmful.

In fact, no matter how thick the oil, it is during the initial response that health-threatening vapors are at their highest levels.

Long-term risks for those who have extensive contact with oil include skin cancer, kidney disease, liver disease and nervous system damage.

Short-term health problems have surfaced in Alaska, where dozens of cleanup workers have reported breathing problems, vomiting, skin rashes and boils, or other symptoms apparently tied to contact with the oil. In one incident there in May, 14 workers who did not have respirators, were hospitalized overnight. We understand that some involved in the cleanup here have reported skin irritation or other problems.

Many conditions present in the Narragansett Bay cleanup magnify the health and safety risks. Warm temperatures speed up the vaporization of the oil and contribute to higher exposure levels. At the same time, workers in warm weather are less likely to wear even rudimentary protective clothing, and thus tend to have more skin contact with the oil. The combination of salt water and oil can increase skin irritation.

Preparedness.

The four oil spills the nation has witnessed since March show that after-the-fact reactions are not an acceptable response to such emergencies. Among other things, this is a surefire recipe for endangering the health of workers unecessarily. If trained and equipped workers are not already available, there is no way to mount a prompt response without putting people at serious risk.

On June 19, the petroleum industry announced a proposed plan for timely responses to spills nationwide. Unfortunately, the plan sounds a lot like promises made in past years. The plan mentions worker health and only as an afterthought, a small future research proposal.

Emergency response teams and contingency planning should be funded by the oil companies but kept entirely out of their control. The Alaska experience, where oil companies have poorly handled the Exxon Valdez spill and its aftermath, demonstrates the need for this.

In particular, emergency team members should be trained to serve three functions:

- immediate containment, to help lay booms to contain the spilling oil until skimmers can begin operating;
- as instructors for hazardous-waste specialists--handling petroleum or petroleum products-- so that training might begin about the same time that workers are dispatched to a spill; and
- as foremen, to assure that enough qualified supervisors are readily available as new workers are trained and dispatched to cleanup sites.

Testimony of Herbert Lobdell, LIUNA Vice President, before House Committee on Merchant Marine and Fisheries, 16 June 1989;

Letter to Allan McMillan, Assistant Secretary for Occupational Safety and Health, U.S. Department of Labor, from Angelo Fosco, 28 June 1989;

Testimony of Ronald Simon before House Committee on Public Works, 28 June 1989.

Testimony to a Hearing of the U.S. House of Representatives
Committee on Merchant Marine and Fisheries,
Subcommittee on Oceanography and the Great Lakes,
July 5, 1989, Newport, Rhode Island

Dr. Malcolm L. Spaulding
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70 Dean Knauss Drive
Narragansett, Rhode Island 02882

The recent spill of 294,000 gallons of No. 2 oil at the mouth of Narragansett Bay from the *T/V World Prodigy* has once again dramatically illustrated the vulnerability of the living marine resources and habitats of the bay and surrounding Rhode Island and Block Island Sound waters to accidental spills of petroleum products. The public awareness and concern for the potential long- and short-term impacts of the spill were further heightened by the extraordinary number of recent, large scale spills in coastal U.S. waters: *Exxon Valdez* in Prince William Sound, Alaska (11.4 million gallons of Prudhoe Bay crude); *Presidente Rivera*, Delaware River, Claymont, Delaware (1.6 million gallons of No. 6 industrial heating oil); and *Rachel-B* in Houston Shipping Channel, Laporte, Texas (250,000 gallons of heavy crude oil). The occurrence of these four spills in a three month period is unprecedented in the history of U.S. oil spills.

Short- and Long-Term Impacts on Living Marine Resources and Habitats

The short-term impacts of the *World Prodigy* spill were substantial with oiling of much of the southeastern coast of Jamestown (Beavertail Point to the Dumplings), the Newport coastline (Castle Hill to Fort Adams), the Narragansett shoreline (Black Point to Bonnet Point) and, to a much lesser extent, the southern coast of Rhode Island (Green Hill Point to Jerusalem). These impacted areas are graphically shown in Figure 1 based on a low level aerial overflight taken on June 26, 1989 at 1500. The principal impacts on most shoreline areas were oiling of the coastline or intertidal habitats. For areas that received particularly large volumes of oil, such as Mackerel and Hull Coves and to a lesser extent the Bonnet Point-Camp Varnum shoreline there was ample evidence of impact on marine resources, particularly those in the early life stages. The shoreline however showed rapid recovery, from a visual perspective, with the light oil or sheen rapidly (several days) weathering. Shorelines which were heavily impacted can be expected to leach oil back into the water column as oil is flushed out of the coarse sand and gravel (Mackerel Cove) and boulder (Narragansett Towers) beaches. This process will likely take weeks or months to occur. The long-term implications to living marine resources of this leaching oil will probably be minor. The shoreline transect study initiated as a cooperative effort between ASA, University of Rhode Island (URI), and EPA scientists on June 25, 1989 (ASA, 1989) and currently in progress will document these long term impacts. The study will follow the recovery of the marine resources at selected transects in areas that have received extensive oiling.

The oil from the *World Prodigy* was transported primarily by the winds and tides, with the winds most often dominating the spill movement. A summary of the time dependent oil motion, as observed from NOAA, USGS, and ASA aerial overflights, is presented in Figure 2. Tides and winds initially carried the spill into Narragansett Bay with surface oil reaching as far north as the Jamestown and Newport Bridges on June 24, 1989. During 25 June the winds blew from the northwest until mid day and then from the northeast for the rest of the day. These winds transported oil out of Narragansett Bay into Rhode Island Sound, eventually reaching Pt. Judith and finally into the eastern end of Block Island Sound. Subsequent winds (westerly) and tidal currents kept most of the oil out of Narragansett Bay. The spill covered a surface area of 123 square miles at its maximum extent. The northerly winds on June 25, 1989 were pivotal in minimizing the transport of oil into Narragansett Bay and the impact of that oil on the diverse habitats and living marine resources of the bay. In summary, we were lucky!

The spilled No. 2 oil was predicted (ASA, 1989) and observed to rapidly evaporate and weather. Within one or two days most of the toxic (aromatic) fractions of the oil had disappeared. Short-term impacts on early life stages of several marine fish and shellfish species (tautog, cunner, scup, sea robins, larval lobsters and several other species) in Rhode Island Sound were observed by NOAA, National Marine Fisheries Service (NMFS) scientists (Sherman, 1989) to be significant within the slick. Outside the slick no impact was observed. This impact was of particular concern because of the abundance of spawning activity in the area. Within several days however the area was observed to be repopulating.

The short-term impacts of the spill hence are of an acute, toxic nature with the loss of early life stages of several species of importance. The long-term impacts, under study by NMFS, will likely be subtle, small and substantially less than the normal environmental variability in the marine fish populations of interest (Spaulding et al., 1983; 1985).

The impacts of the spill on the benthic community were estimated to be minimal because of the limited oil reaching the sea floor (ASA, 1989). This preliminary assessment was supported by URI diver surveys of the bay and sound bottom immediately after the spill. Detailed analysis of sediment cores and further surveys of the bottom by URI scientists will provide a detailed assessment of possible benthic impacts.

Organizations using bay water for aquariums or scientific experiment (URI, EPA, NOAA/NMFS) were forced to close their intakes for a day or two. There are however no long-term impacts anticipated.

In summary, the short-term impacts of the *World Prodigy* spill were observed to be due to oiling of selected shorelines and coves and acute, toxic impacts on the early life stages of selected marine species. Because the oil rapidly dissipated and was transport into Rhode Island Sound, the long-term impacts, while present, are anticipated to be subtle and small. This assessment is in general agreement with the analysis of previous large spill events in a coastal marine environment (National Academy of Sciences, 1985).

The public and users of the coastal waters were extremely fortunate that the *World Prodigy* had such a small impact on the marine resources of the bay and surrounding waters. A combination of rapid and effective spill response by federal and state officials, calm weather conditions with good visibility, a spill site outside Narragansett Bay in a deep water, low current area and fortuitous weather conditions minimized the impact. The impacts on Narragansett Bay could have been substantially greater had any of these conditions been different. It is important to note that the impacts of the spill are critically dependent on weather conditions, over which we have no control.

Natural Resource Damage Assessment

To assess the long-term damages to natural resources from the spill for purposes of compensation, the "trustees" for the resources can elect to perform either a Type A or Type B assessment under Section 301(C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [Federal Register, 43 CFR Part II Natural Resource Damage Assessments: Final Rule, August 1, 1986, March 20, 1987]. Type A assessments are restricted to small scale spills (size undefined) and use a modeling methodology, the Natural Resources Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME), to assess damages (EAI and ASA, 1987a,b). NRDAM/CME is comprised of three integrated submodels describing physical fates, biological effects and economic damages. The model is microcomputer based and requires minimal observational data as input. Assessments can be performed in several days. The Type A approach was developed to balance the cost of performing the assessment against the assessed damage. A Type B approach provides a more detailed evaluation combining field observation programs, laboratory experiments, data analysis, and modeling tools, as appropriate, to assess short and long-term damages. Type B assessments are usually restricted to larger spill events with potentially higher damages and are considerably more costly to perform than a Type A assessment. The advantage however is that the Type B assessment provides a better estimate of the damage.

The NRDAM/CME has been employed to assess the damages for several relatively large scale spill events since its development (Grigalunas et al., 1989; D.P. French, personal communication). These assessments are also performed as a low cost screening method by the trustees to determine the potential damages associated with a spill event. In many cases the potential costs for a detailed assessment (Type B) are larger than the damages being assessed.

As an example, the natural resource damages for the *World Prodigy* spill were determined by using the NRDAM/CME model (without provision for closures of public beaches or shellfish areas). The damages were assessed assuming a range of input parameters for the description of the spill and environmental conditions. The model assessed damages are on the same order as the cost to perform a detailed assessment (Type B). Given this situation, the trustees may well decide to use the Type A approach even though it only represents the spill situation and associated impacts in a very simplistic way. Grigalunas et al. (1989) show that even when applied to spills of similar size as the *World Prodigy*, the damage assessments generated by the model are consistent with more detailed assessments.

This analysis suggests that the NRDAM/CME and the Type A assessments are likely to be applied to relatively large scale spill events because the assessment costs are minimal and the predicted impacts in approximate agreement with more detailed analyses.

A total of about $400,000 was spent by the Department of Interior to develop the NRDAM/CME; $300,000 for the economics model and $100,000 for the biological and physical fates. This cost included preparation of chemical, physical, and biological databases, model coding, testing, and evaluation, and sensitivity studies. The model addresses 470 contaminants and 10 biological provinces that cover the entire U.S. marine coastal waters. These limited funds and the short time allocated for the study were inadequate to fully develop, test, and evaluate such a complex modeling tool.

External review of NRDAM/CME performed by a scientific review panel as part of the model development, by representatives of the petroleum and chemical industries, and most recently by the Minerals Management Service (MMS, 1989) indicated several major weaknesses with the model. Many of the weaknesses were addressed in a revision of the model. Others were beyond the scope of work and funds allocated by the Department of Interior for the effort.

The overwhelming criticism was that the model did not adequately represent the specific conditions (physical, biological, and economic) in the areas of potential application. Another major area of criticism was the lack of detailed validation of the model against actual spill events. This later criticism is valid but difficult to address because of the lack of data. Other areas of concern were the process formulations in the submodels and the lack of detailed sensitivity studies to establish the predictive performance of the model. In the extension of the model to the Great Lakes, currently in progress, several of these areas of criticism are being addressed.

In summary, the NRDAM/CME model is a reasonable first step in developing a reliable, useful natural resources damage assessment tool. It is likely to see extensive use even for large scale spills because of the minimal assessment cost. As part of the normal two year review and revision cycle the model needs to be substantially improved and the data bases upgraded to more accurately reflect actual conditions in the vicinity of potential spills. A geographic information system (GIS) can be used to organize and analyze the available spatial data and allow the model to more realistically represent the impact of actual spill events. The model should also undergo thorough verification with the available data. The Subcommittee on Oceanography and the Great Lakes is requested to support the allocation of $3 million through the Department of Interior for the upgrade and improvement of the NRDAM modeling approach. These resources will be well spent and will assure that a cost effective, realistic technique is available to perform damage assessment for oil spill events.

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Dr. Malcolm Spaulding, President of Applied Science Associates, Inc. (ASA), a marine science consulting firm located in Narragansett, Rhode Island and a Professor in the Department of Ocean Engineering at the University of Rhode Island (URI) holds his M.S. from MIT and Ph.D. from URI, both in mechanical engineering. He has been extensively involved in hydrodynamic, pollutant transport, and oil spill modeling research since the early 1970's, and is an internationally recognized expert in these fields. He has been called into consultation on numerous oil spill model development and review efforts. His international experience includes a NATO Advanced Studies Workshop on Estuarine Modeling (Portugal), a Fulbright Fellowship to the USSR, and a senior scientist fellowship from the Royal Norwegian Council for Scientific Research.

Dr. Spaulding has served as project manager on an MMS funded project to assess the impact of oil spills on commercial fisheries in the Georges Bank - Gulf of Maine region from 1980-1982. From 1985 to 1988 he directed a NOAA/OCSEAP circulation and oil spill trajectory modeling contract for Alaskan coastal waters. In this capacity he has prepared trajectory modeling reports for three lease sales, published two articles in refereed journals on circulation model verifications in Alaskan waters and attended numerous synthesis and information transfer meetings. He recently completed a hindcast of the *Exxon Valdez* spill and provided trajectory and fate model forecasting for the Rhode Island Department of Environmental Management for the *World Prodigy* spill. In recognition of his expertise and experience in circulation and oil spill trajectory and fates modeling, Dr. Spaulding was selected and currently serves as a member of the National Research Council (NRC) Physical Oceanography Panel selected to review the MMS Environmental Studies Program (ESP), and the moratorium on oil development on Georges Bank.

FIGURE 1

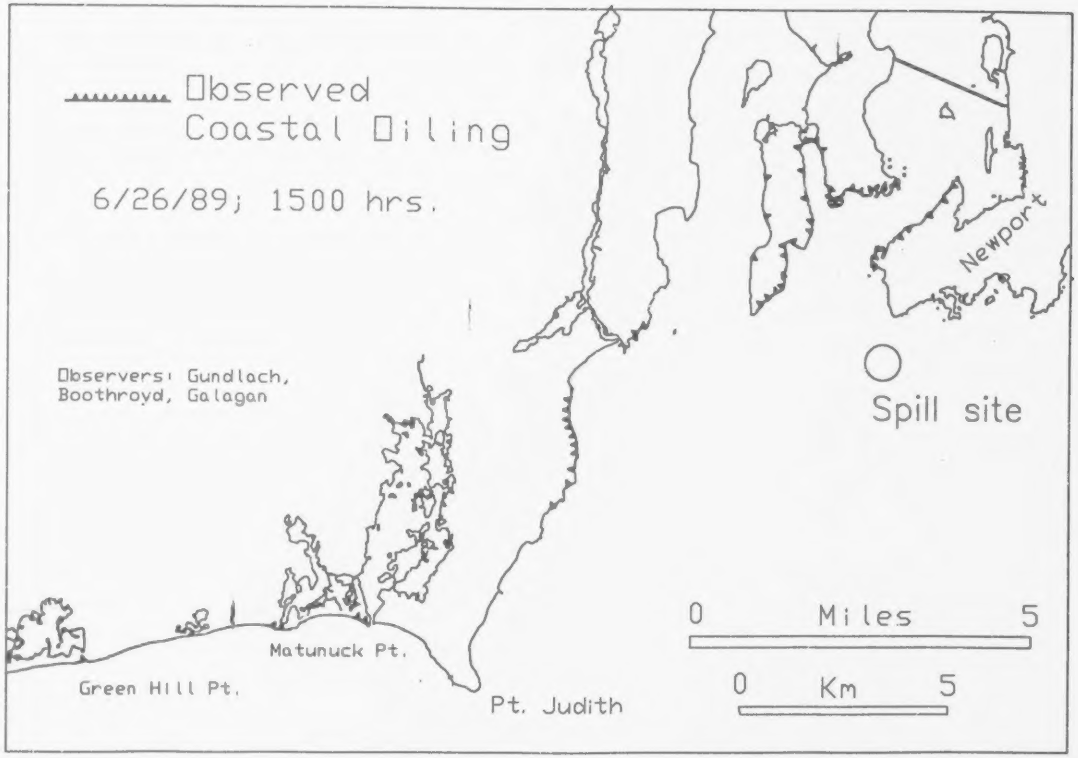
Observed
Coastal Oiling
6/26/89; 1500 hrs.
Observers: Gundlach,
Boothroyd, Galagan
Newport
Spill site
0 Miles 5
0 Km 5
Green Hill Pt.
Matunuck Pt.
Pt. Judith

FIGURE 2

OIL SPILL DISTRIBUTION MAPS
WORLD PRODIGY OIL SPILL, JUNE 23, 1989, RHODE ISLAND SOUND

The figures show the surface oil spatial distribution of the World Prodigy oil spill from June 24 to 28, 1989. The maps were constructed from aerial overflights, data collected by NOAA/USCG and Jon Boothroyd, University of Rhode Island, Geology Department, and Erich Gundlach, E-Tech, Inc., Narragansett, Rhode Island. A summary map showing the maximum spatial extent of oiled surface area, independent of time, for the spill is given. The maximum area covered with oil is 123 square miles. A figure is also presented showing the forecast of the ASA model for the maximum spatial extent of the oiled surface area.

Further information on these figures can be obtained from:

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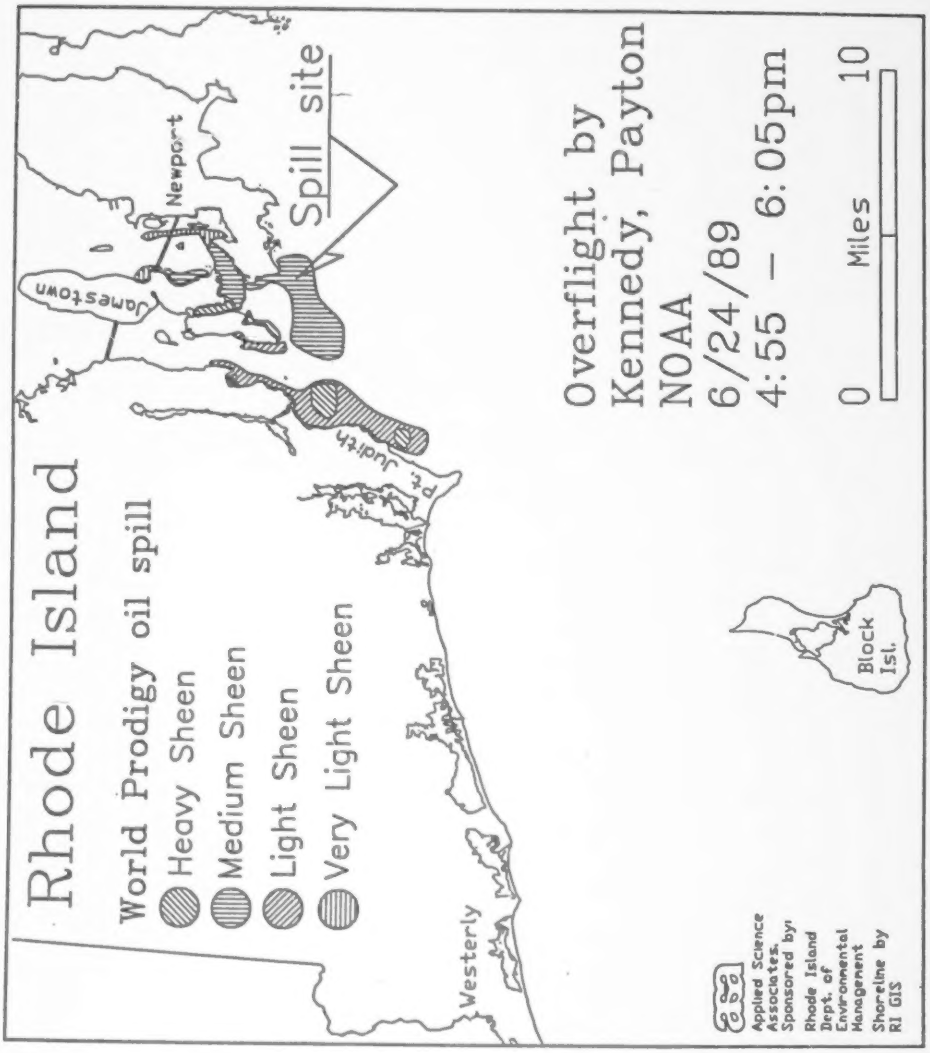
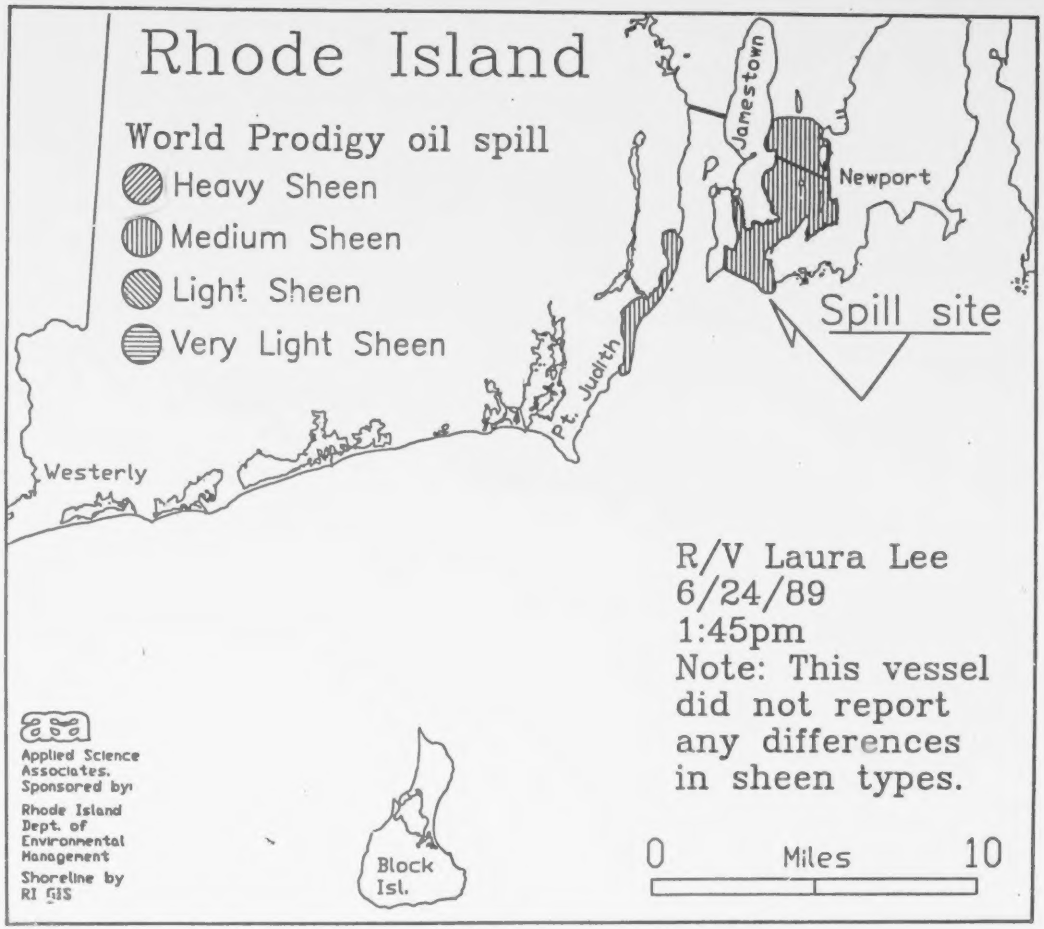
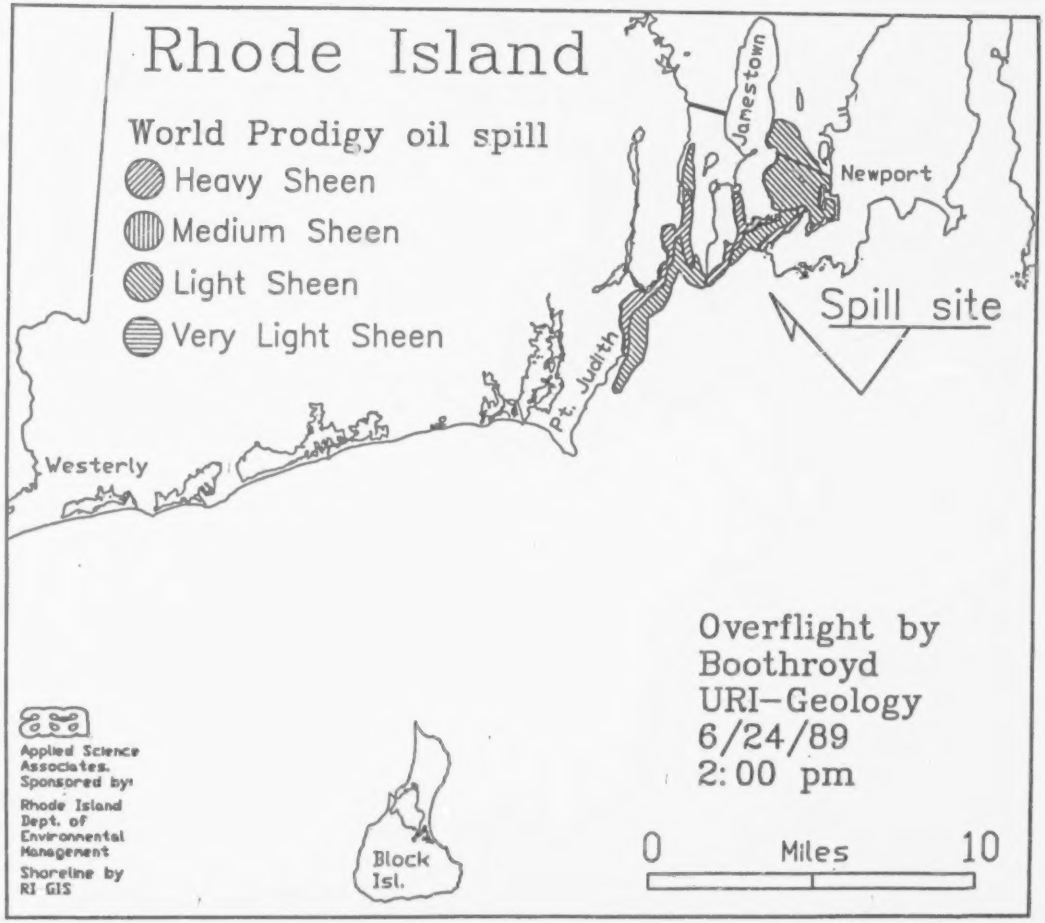
Acknowledgments:
The aerial overflight data was provided by the NOAA/USCG response team. Debbie Payton and Gary Ott, NOAA faxed these plots to ASA on daily basis during the spill. Jon Boothroyd, University of Rhode Island, Geology Department and Erich Gundlach, E-Tech, Narragansett, Rhode Island provided aerial overflight data as well as interpretation of low level oblique photographs. The Rhode Island Geographic Information System and Narragansett Bay Data Center provided the Rhode Island coastline data to ASA in a timely manner.


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Westerly
Pt. Judith
Jamestown
Newport
Spill site
Block Isl.
Overflight by
Kennedy, Payton
NOAA
6/24/89
4:55 - 6:05pm
0
Miles
10
Applied Science Associates.
Sponsored by:
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
R/V Laura Lee
6/24/89
1:45pm
Note: This vessel did not report any differences in sheen types.
0
Miles
10
Applied Science Associates.
Sponsored by:
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
▨ Heavy Sheen
▥ Medium Sheen
▧ Light Sheen
▤ Very Light Sheen
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
Overflight by
Boothroyd
URI–Geology
6/24/89
2:00 pm
0
Miles
10
Applied Science Associates.
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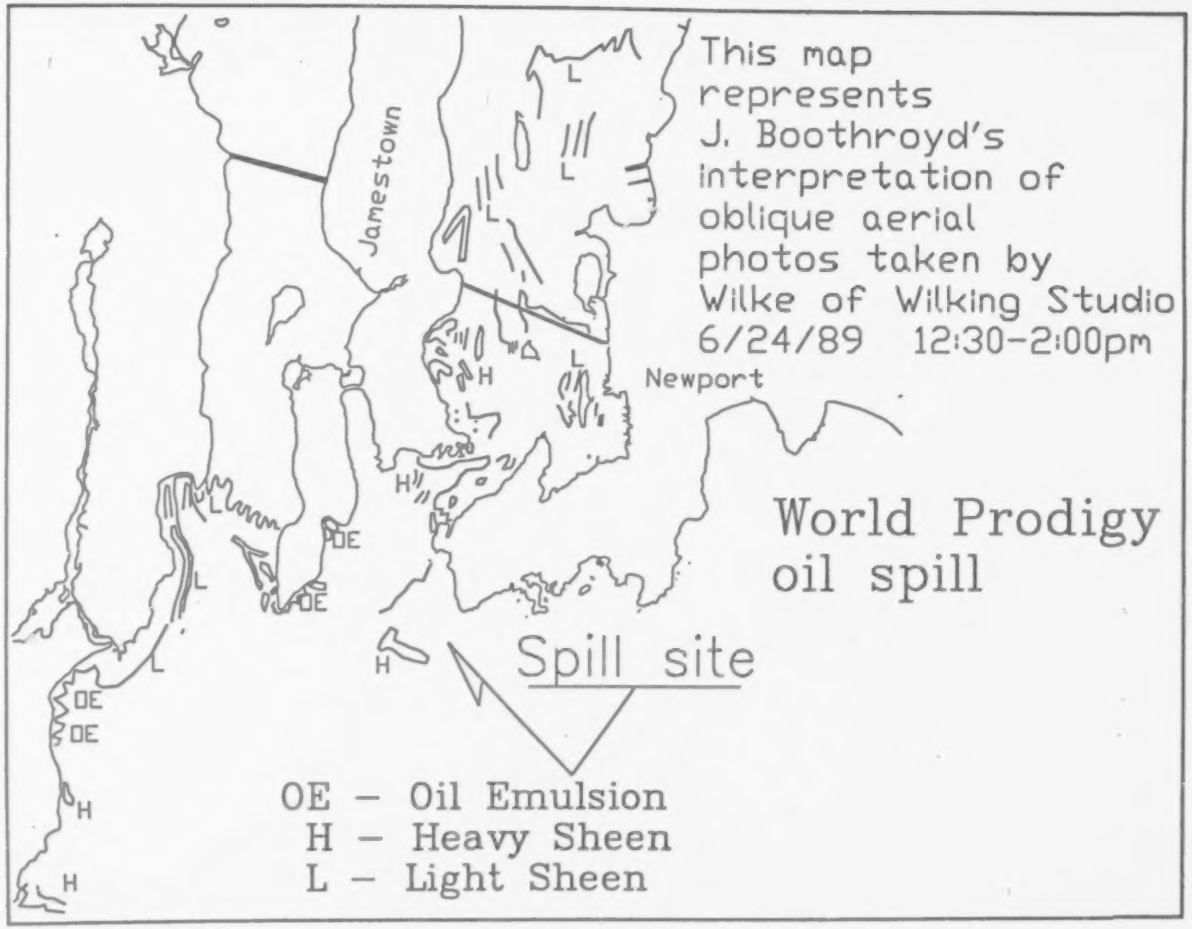
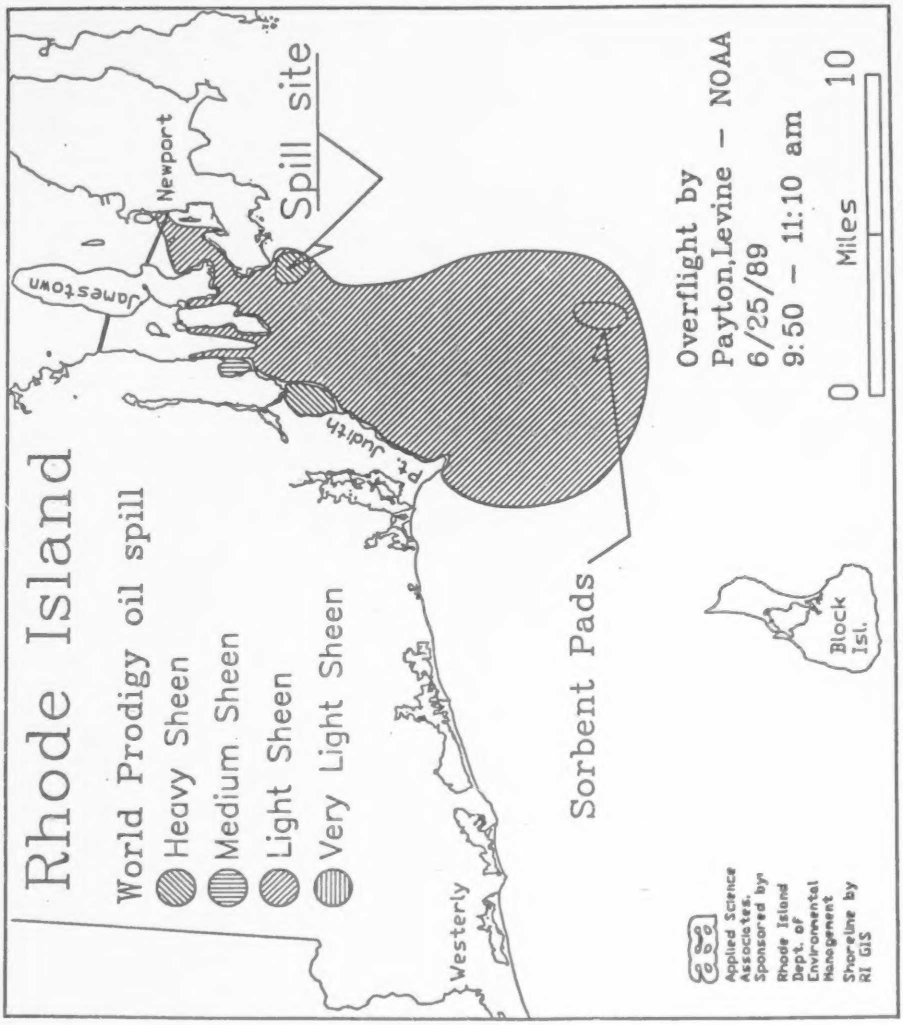
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS



This map represents J. Boothroyd's interpretation of oblique aerial photos taken by Wilke of Wilking Studio 6/24/89 12:30-2:00pm

World Prodigy oil spill

Jamestown
Newport
Spill site
OE – Oil Emulsion
H – Heavy Sheen
L – Light Sheen
L
L
L
L
H
H
L
L
L
OE
OE
OE
OE
H
H
H


Rhode Island
World Prodigy oil spill
▨ Heavy Sheen
▤ Medium Sheen
▧ Light Sheen
▥ Very Light Sheen
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Sorbent Pads
Block Isl.
Overflight by
Payton,Levine - NOAA
6/25/89
9:50 - 11:10 am
0
Miles
10
Applied Science Associates.
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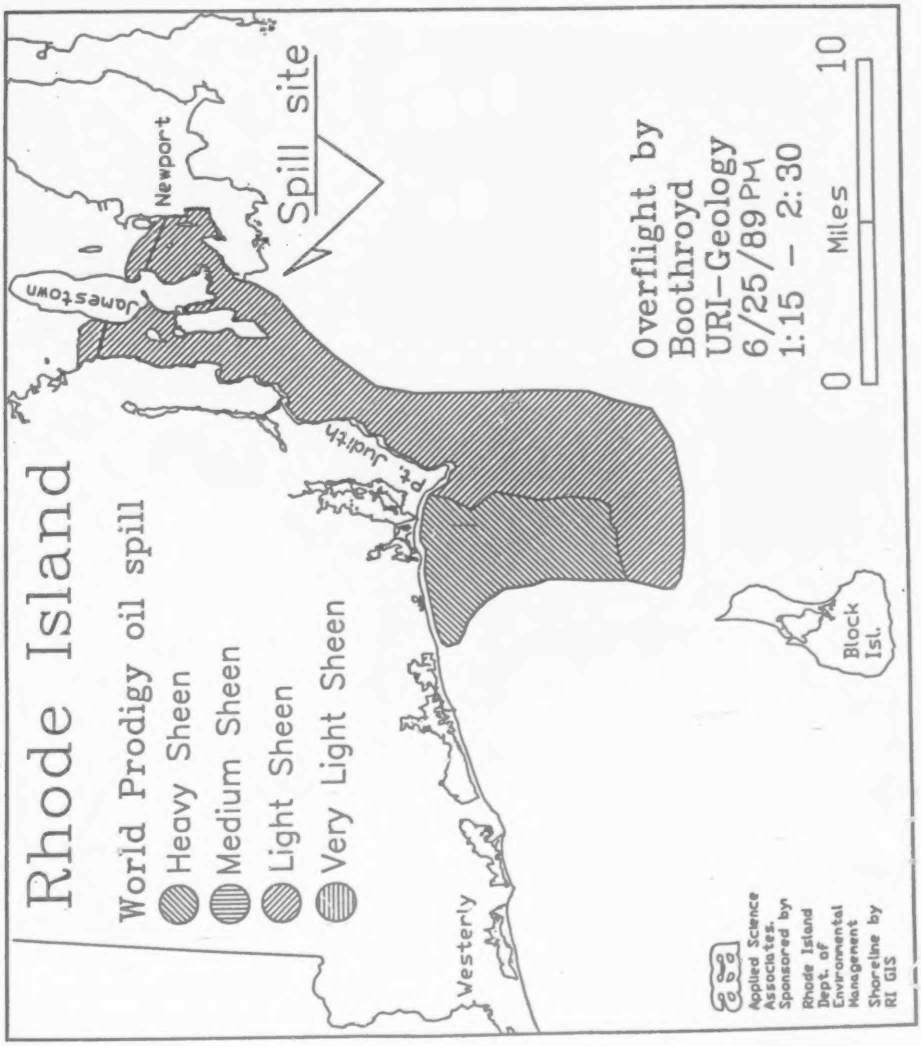
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Westerly
Pt. Judith
Jamestown
Newport
Spill site
Block Isl.
Overflight by
Boothroyd
URI-Geology
6/25/89 PM
1:15 – 2:30
0
Miles
10
asa
Applied Science Associates.
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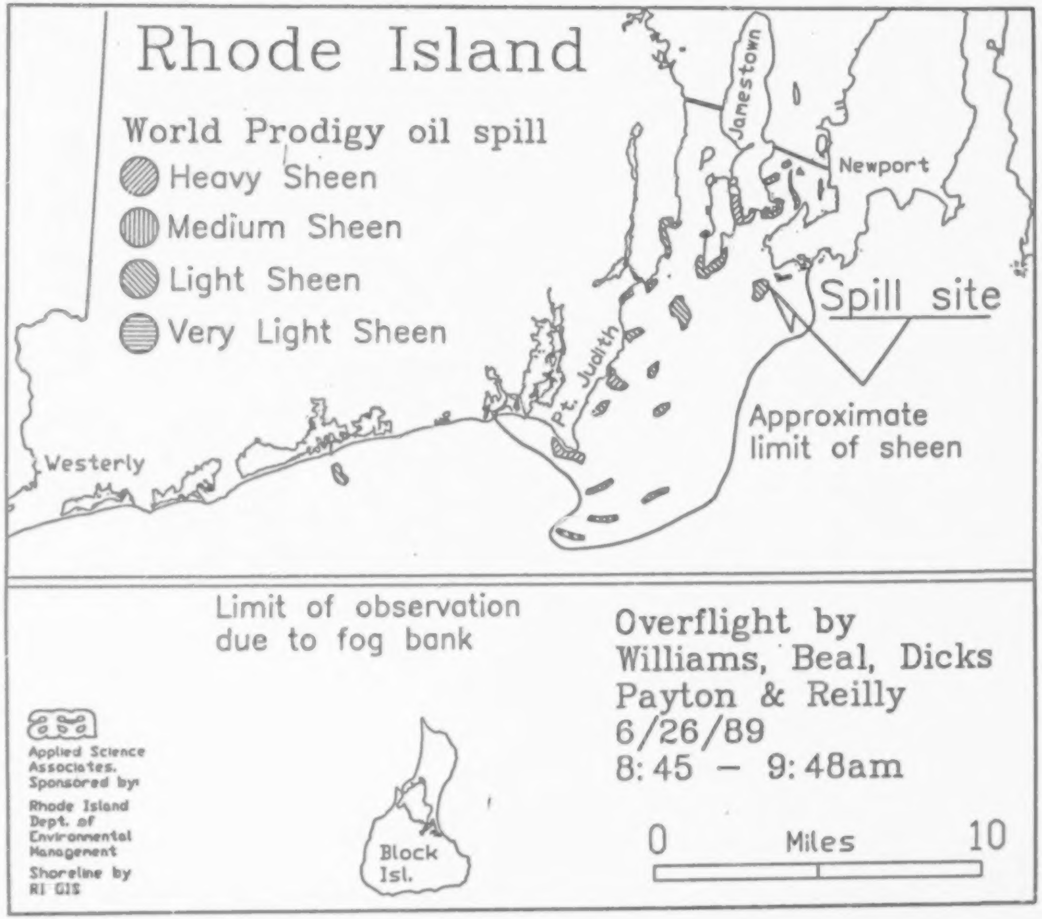
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
▨ Heavy Sheen
▥ Medium Sheen
▧ Light Sheen
▤ Very Light Sheen
Jamestown
Newport
Spill site
Pt. Judith
Approximate limit of sheen
Westerly
Limit of observation due to fog bank
Overflight by Williams, Beal, Dicks Payton & Reilly
6/26/89
8:45 – 9:48am
0 Miles 10
Block Isl.
Applied Science Associates.
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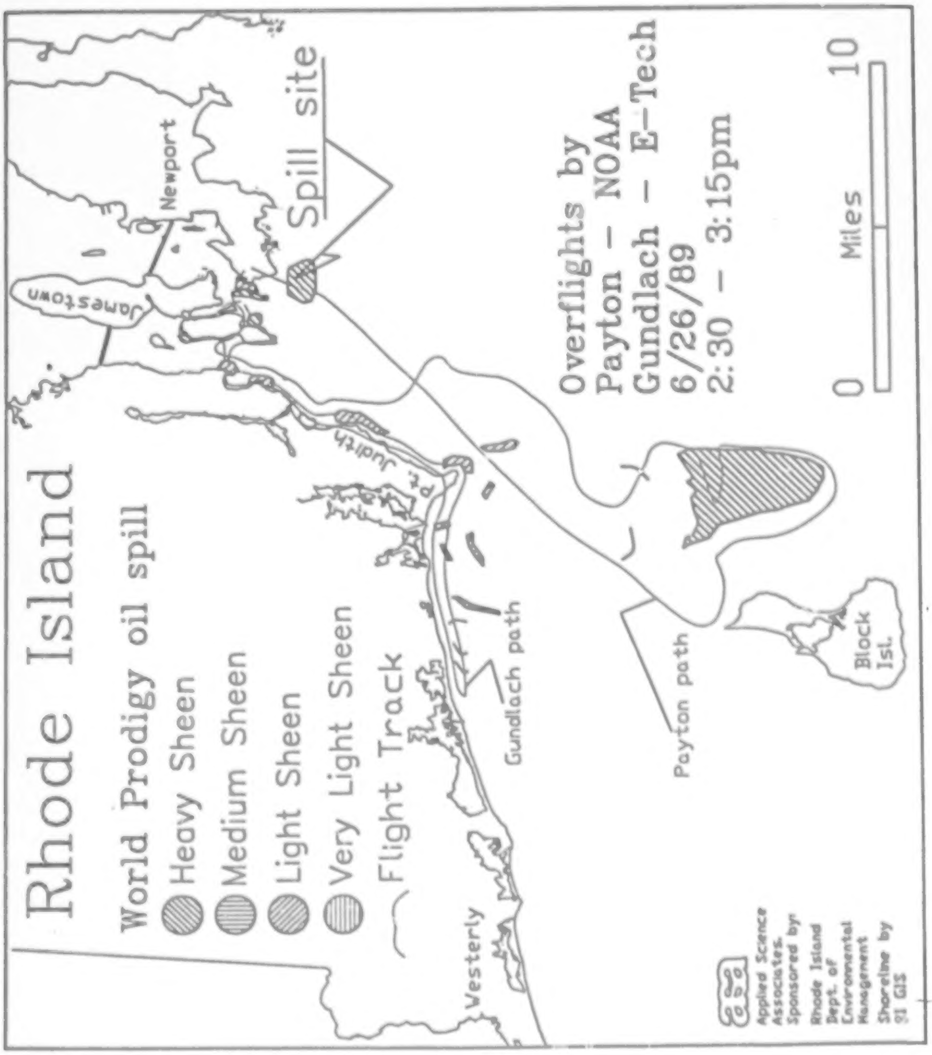
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Flight Track
Vesterly
Gundlach path
Payton path
Pt. Judith
Jamestown
Newport
Spill site
Block Isl.
Overflights by
Payton - NOAA
Gundlach - E-Tech
6/26/89
2:30 - 3:15pm
0
Miles
10
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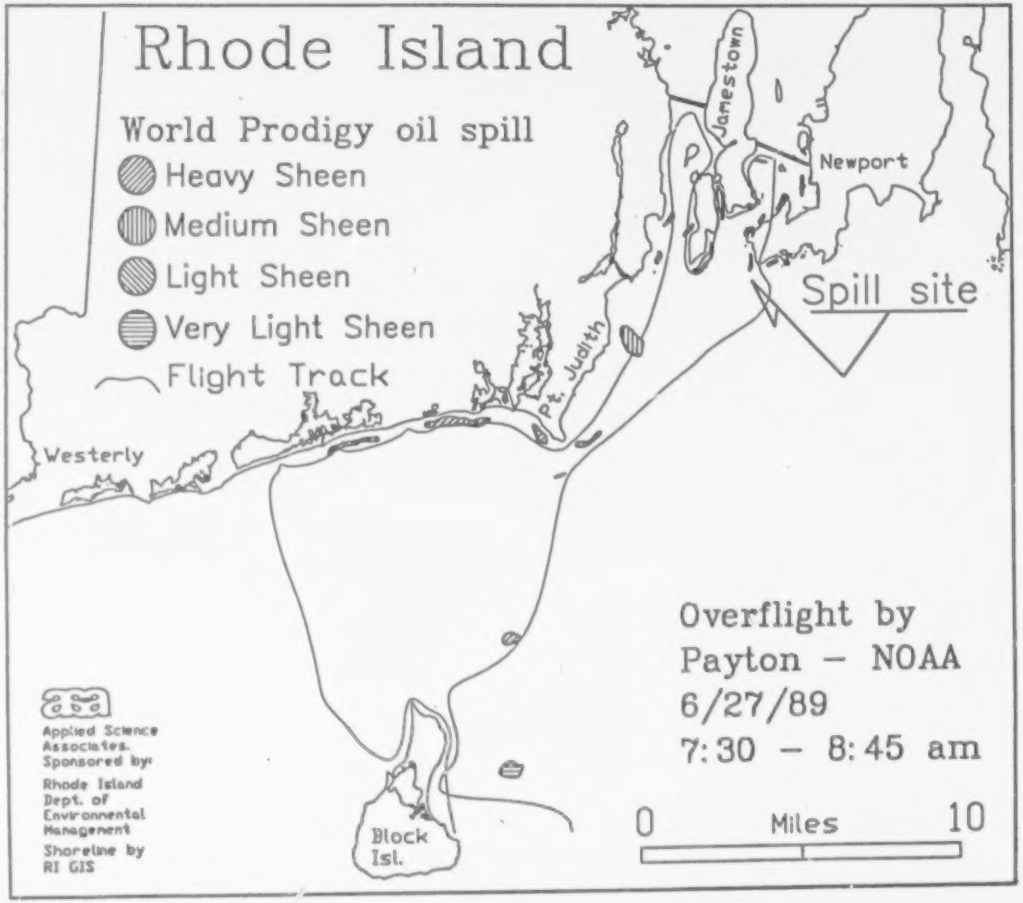
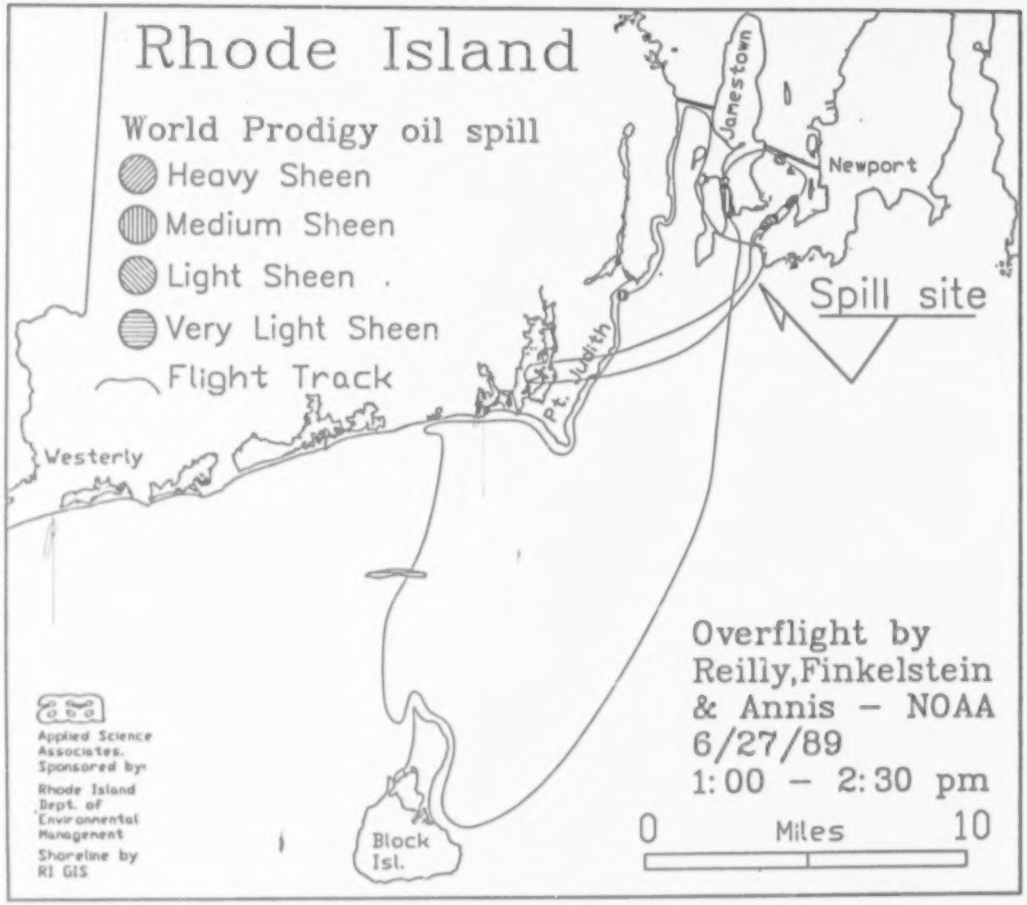
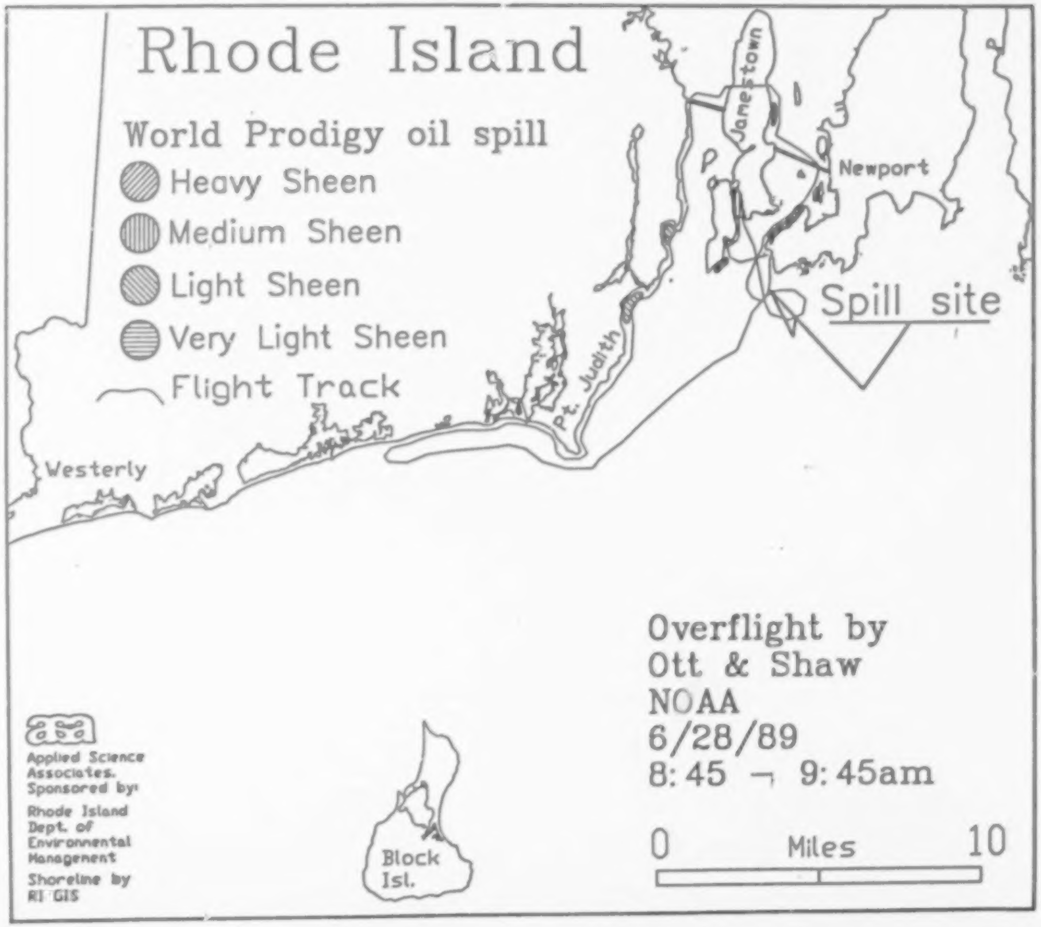
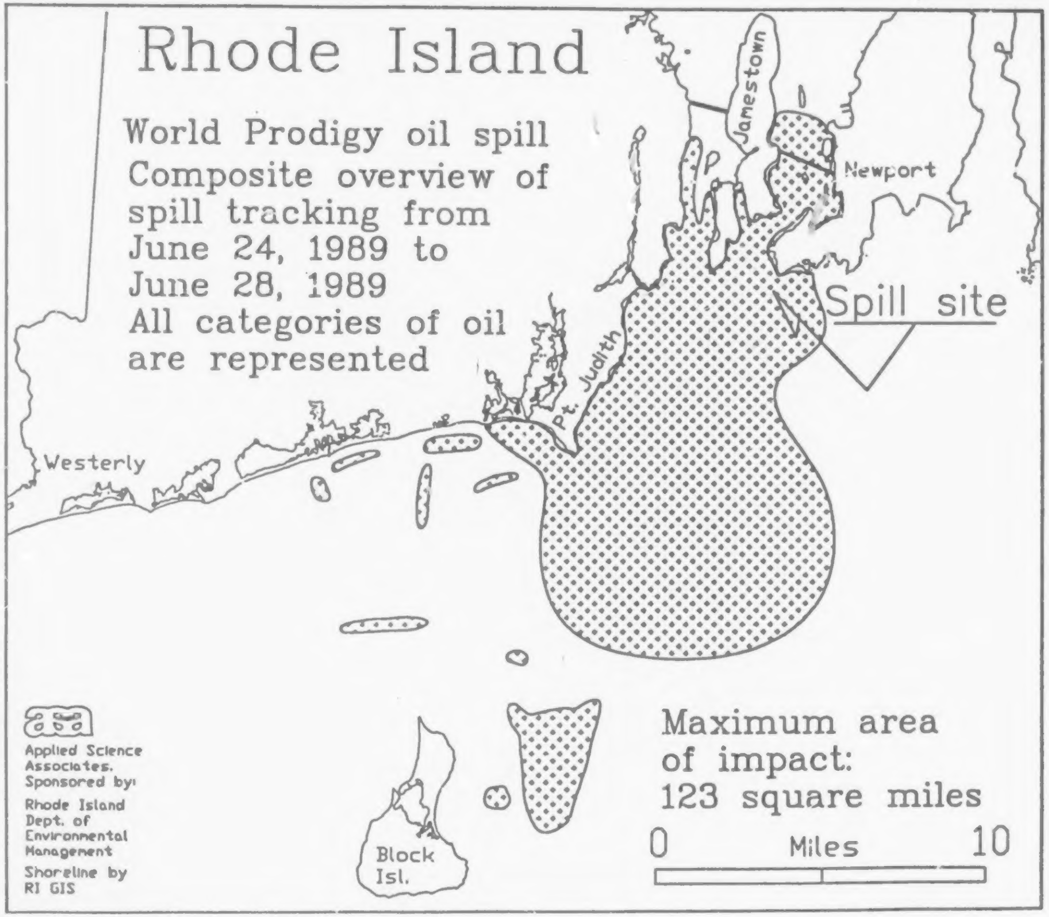
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Flight Track
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
Overflight by
Payton - NOAA
6/27/89
7:30 - 8:45 am
0
Miles
10
asa
Applied Science Associates.
Sponsored by:
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Flight Track
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
Overflight by Reilly, Finkelstein & Annis - NOAA
6/27/89
1:00 - 2:30 pm
0 Miles 10
Applied Science Associates.
Sponsored by:
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS


Rhode Island
World Prodigy oil spill
Heavy Sheen
Medium Sheen
Light Sheen
Very Light Sheen
Flight Track
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
Overflight by
Ott & Shaw
NOAA
6/28/89
8:45 – 9:45am
0 Miles 10
asa
Applied Science Associates.
Sponsored by:
Rhode Island Dept. of Environmental Management
Shoreline by RI GIS



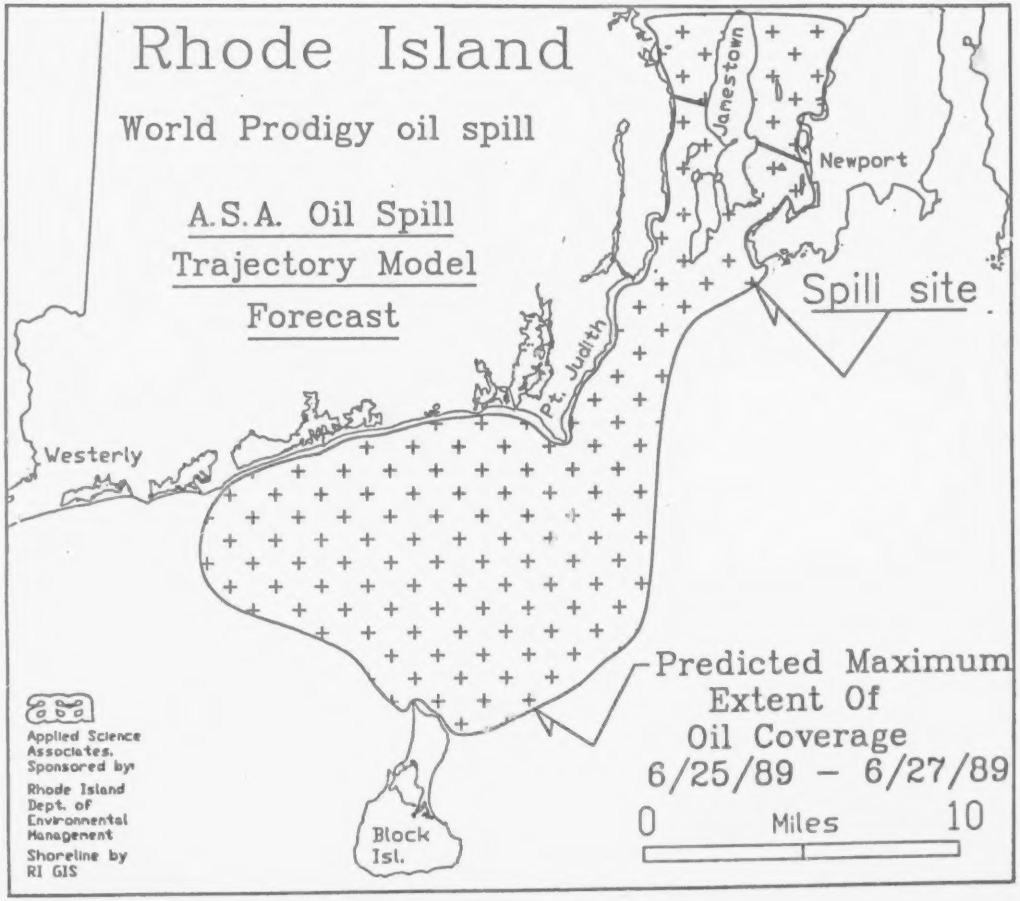
Rhode Island

World Prodigy oil spill
Composite overview of
spill tracking from
June 24, 1989 to
June 28, 1989
All categories of oil
are represented

Maximum area
of impact:
123 square miles

Applied Science
Associates.
Sponsored by:
Rhode Island
Dept. of
Environmental
Management
Shoreline by
RI GIS

Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block
Isl.
0
Miles
10


Rhode Island
World Prodigy oil spill
A.S.A. Oil Spill
Trajectory Model
Forecast
Jamestown
Newport
Spill site
Pt. Judith
Westerly
Block Isl.
Predicted Maximum Extent Of Oil Coverage 6/25/89 - 6/27/89
0
Miles
10
asa
Applied Science Associates.
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Rhode Island Dept. of Environmental Management
Shoreline by RI GIS

July 5, 1989
Salve Regina College
Newport, Rhode Island

Testimony Presented at a Congressional Field Hearing of the House Subcommittee on Oceanography and the Great Lakes

by

Dr. Robert A Duce, Dean
Graduate School of Oceanography
University of Rhode Island

Regarding

The Oil Spill from the Tanker *World Prodigy*

Brief History

The Greek tanker *World Prodigy*, loaded with Number 2 fuel oil from Bulgaria and bound for the Port of Providence, ran aground on Brenton Reef at approximately 1638 hours on Friday, June 23, 1989. It immediately began leaking its cargo, and a recent estimate indicated that the total oil spilled was approximately 300,000 gallons, or about 1000 tons.

One of the advantages of being a small state is that many of the people in any line of work know each other, and may even have had an opportunity to work together. When we first learned of the spill at the University of Rhode Island (URI) on Friday evening, it was possible that night to call most of the University's environmental scientists who we expected would participate in evaluating the spill. It was arranged that they would meet at the Graduate School of Oceanography (GSO) with colleagues from the EPA's Narragansett Environmental Research Laboratory the next morning. During that meeting on June 24 the outlines of the of URI and EPA response to the oil spill were developed. By mid-morning a URI scientist from the Department of Geology left to examine the extent of the spill from the air in a National Guard aircraft, a GSO scientist went with EPA personnel to collect surface and deep water samples for chemical analysis, and most of the rest of the URI personnel left by noon on the GSO's research vessel *Laurie Lee* to assess the extent of the spill and to collect samples of sediments from areas that might soon be impacted by the oil. Diver surveys were also made by GSO personnel. During the day URI arranged for scientists from all federal, state, university, and private groups involved in scientific studies of the spill to meet at GSO on the next day, Sunday, to evaluate and coordinate our individual response efforts.

After that comprehensive scientific meeting on Sunday a joint press conference involving all the scientific groups was held. During that day and on subsequent days additional water samples as well as samples of zooplankton, phytoplankton, and other organisms in the water column were collected aboard the *Laurie Lee* for biological evaluation by GSO and Department of Zoology scientists. Additional samples of sediments and organisms living on the bottom of the Bay were collected in both impacted and unimpacted areas. University personnel also participated in the design and execution of detailed shoreline surveys at a number of impacted sites. On Sunday Dr. Michael Pilson was appointed to coordinate the University of Rhode Island's response to the oil spill. During Monday a GSO scientist directed an overflight as far as Montauk Point, Long Island to discover if any marine mammals were likely to be in the path of the spreading spill and to determine the southernmost extent of the oil at that time. These activities were continued for several days. An evaluation of the economic impact of the spill was begun by URI's Department of Resource Economics.

The activities noted above were carried out in cooperation and in coordination with those being undertaken by the NOAA National Marine Fisheries Laboratory in Narragansett, EPA's Narragansett laboratory, the Rhode Island Department of Environmental Management, the Coast Guard, and Applied Science Associates. Citizen volunteers from URI's successful and effective Pond-Watchers program began monitoring Rhode Island's south shore.

Intensive scientific efforts under the overall coordinating leadership of Ms. Caroline Karp of the Rhode Island Department of Environmental Management continued for about seven days, after which the oil was essentially gone. Relatively small amounts of oil were trapped in the sand on one or two of the sand beaches and in the cracks and holes in some parts of the rocky shoreline. Follow-up observations to examine the fate of the oil, any long-term effects, and the recovery of the ecosystem will continue as long as necessary.

Press conferences were also held at GSO on Tuesday, June 23 and Friday, June 30. At other times URI personnel answered dozens of questions from various media groups.

Extent of the Immediate Impact

Number 2 fuel oil is light, quite fluid, and moderately volatile. Many of its most soluble components are quite toxic to animal life in the sea. However, their solubility is low and they dissolve slowly under the conditions experienced with this spill. Accordingly, the oil spread rapidly, but we believe that it remained largely on the surface of the water where much of it appears to have evaporated. Most planktonic organisms floating just below the oil were probably killed.

These include zooplankton, lobster larvae (which at this time of year come very close to the ocean surface), and eggs and larvae of certain species of fish. Where large quantities of oil floated into coves and then against the rocks and beaches, it was mixed by wave action several feet down into the water where it would have killed most of the animal life and probably some of the algae which it contacted. Brown algae appears to have survived, but may have suffered some physiological damage. In these heavily impacted locations at least several hundred small lobsters and crabs were killed. Probably most of the barnacles, mussels and worms on the rocks and in the sand also died. These effects appear to be confined to the top several feet even in the most seriously impacted regions along the shorelines. Isolated patches of oil spread widely during the first two or three days, occupying a total area of at least one hundred square miles, although the actual coverage by the patches was at most a few percent of this area. Aerial surveillance was not sufficiently complete to obtain an accurate and detailed estimate of the coverage. After three to four days almost no oil could be found on the surface of the water, and none at all could be found after five to six days. Considerable oil had soaked into the beach sand in two of the most heavily impacted coves. Oil was barely detectable in Mackerel Cove after eight days, but it was still present in considerable quantities in the sand and easily detectable by smell at Hull Cove.

Anticipated Long-Term Impact

Because of the relatively calm weather conditions at the time of the spill and during the days following, the oil was not driven down into the water column except for the relatively limited amounts along the shore. In this intertidal zone the growth of barnacles, mussels, crabs, and other small intertidal animals is extremely rapid during the summer. It is expected that in a relatively short time these animals will have recolonized the shorelines where the previous generation had been killed by the oil. We expect that in several months it will be difficult to detect evidence of the impact of the oil spill by examining the shoreline. Probably a small percentage of the oil dissolved in the water, although the exact amount will never be known. A series of experiments using Number 2 fuel oil and specific components of that oil was begun 12 years ago at the Marine

Ecosystems Research Laboratory at the Graduate School of Oceanography. This study extended over several years. Because of these investigations we now have a good understanding of the fates of these components once they are dissolved in the water column. The components of this oil are rapidly degraded by bacteria, and certainly most and perhaps all of it can be totally destroyed. Under summertime conditions the half-life of the specific components dissolved in the water is approximately one day, with some components lasting shorter times and some longer. After a few days the components of the oil which dissolved in the water would be undetectable by even the most sensitive analytical techniques. Since the oil initially entered only the surface layers of the water, since dispersion is also rapid, and since most of the oil laying on the the surface was gone within three to four days, we anticipitate that after five to six days it would have been virtually impossible to find significant quantities of oil in the water. Samples have been collected to evaluate this prediction, but the sensitive analytical techniques required take some time to complete, and we do not yet have final confirmation.

Plankton samples collected in open water areas impacted by the oil show what appear to be normal populations six days after the spill. Since plankton near the surface under the oil were undoubtedly killed soon after the spill, these normal plankton must have either been brought upward from deeper water below or have been swept into the area on clean surface waters which had not been near the spill, possibly both. The rapid return of normal populations of plankton is reassuring. This ensures that food supplies for higher organisms is back to normal, and reproductive activities should be proceeding in a typical pattern again.

For the reasons noted above, it appears unlikely that any significant quantity of oil could have reached the bottom of Narragansett Bay, except in the intertidal regions. Accordingly, the fishery resources on the bottom, such as lobster and quahogs, should have been largely unaffected. State and federal agencies are examining shellfish samples to confirm this. We took samples of other benthic organsims and of sediments under the areas of thick oil coverage on the surface to examine for any evidence of oil on the bottom. It will be several weeks before the results of these studies are complete. In the meantime, the Graduate School of Oceanography has conducted diver surveys of several regions of the bottom of the Bay under areas where surface oil was abundant. These surveys, by several experienced observers on several different days, were almost uniformly positive. In depths accessible to observations by divers the fauna looked uniformly normal. All animals were filtering or foraging normally. The one possible exception was an area at a depth of about 25 feet on Brenton Reef itself. There was a difference of opinion about the observations at that location. Two divers said the area looked normal, while one said that there were possible subtle effects, with some animals behaving more sluggishly than expected. Since the oil was released from depths of up to 30 feet at the bottom of the tanker, it is probable that some water at that depth in that region had acquired some emulsified or dissolved oil, and the animals at that location and at that depth may have been affected.

Evaluating the evidence available, we believe that it will be difficult if not nearly impossible to document significant long-term environmental effects on Narragansett Bay from this spill. There is no doubt that in several areas there was mortality of fish eggs and larvae, lobster larvae, as well as a number of organisms in intertidal zones. Nevertheless, at this time we have no basis upon which to calculate any negative long-term effect upon the fisheries.

However, we have been quite fortunate. The impacts on the Bay and adjacent coastal waters could have been much worse. For example, if there had been a continuous and strong south wind for two days after the spill, the oil would have been driven much further north in the Bay and the damage would have extended to a much greater length of coastline. There would also have been some possibility that oil could have reached the floor of the Bay with potentially serious damage to bottom communities there, including the extensive commercial shellfish beds in the northern reaches of the Bay. If the spill had occurred in the winter, evaporation would have been slower and any dissolved oil would have remained in the water column much longer, resulting in a greater likelihood of damage to several fisheries.

Thoughts about the Future

We at the University of Rhode Island were exceedingly pleased with the rapid response and excellent cooperation among all the scientific groups concerned with this spill, including state and federal agencies as well as private groups. Nevertheless, the cooperative scientific response was largely on an *ad hoc* basis, and certainly all our efforts would have benefitted from more comprehensive science planning before the accident. For the past year the University of Rhode Island has been developing plans for a Narragansett Bay Center for the Study of Coastal Marine Ecosystems to be located at the Graduate School of Oceanography. Our vision is that this center will provide a focus for scientific, economic, management, and educational activities, and that it will serve as a central repository for information about Narragansett Bay and adjacent coastal waters. Had such a Narragansett Bay Center been in place before the *World Prodigy* spill, our scientific response could have been faster and more comprehensive, and the final results even more effective and useful. Faced with a major disaster, we would have the mechanism in place to help with an appropriate scientific response. Co-locating some personnel from the Rhode Island Department of Environmental Management and appropriate federal agencies at the proposed University Center would result in a unique combination of environmental and management-related personnel to address many natural and social science problems of our estuarine systems. This Center would provide a ready channel to bring technical expertise together to provide advice for those charged with operational responses to events of this type.

Universities are not charged with operational responsibilities when disaster strikes. The agencies that are, such as the Coast Guard, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the National Guard, and the Rhode Island Department of Environmental Management, all responded in an impressively competent manner in this spill. The personnel in these groups are trained both in the academic schools and in field experience. However, the development of strong institutional channels of communication to the academic scientific community would surely benefit all the parties involved.

For this spill we had the benefit of considerable experimental evidence about the behavior of Number 2 fuel oil because of the work done at URI's Graduate School of Oceanography some years ago. We knew something of the effects to be expected and something of the fate of the oil once dissolved in seawater. However, even here our experience was rather limited, and there are many other substances transported on the ocean and discharged and potentially spilled into coastal waters about which we know very little. If scientists are expected to predict the fates of substances in the sea we must carry out many more experiments of the type performed with Number 2 fuel oil years ago.

In conclusion, we were very fortunate that the nature of the oil, the location of the spill, the season and the weather all combined to minimize the effects of this oil spill. We must be concerned, however, about future disasters where we will not be so fortunate. We have seen a number of examples within just the past several months. We must anticipate the occurrence, if not the exact nature, of these spills here in Rhode Island, and we must make adequate scientific plans to be ready.

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